UNITED STATES DISTRICT COURT

FOR THE NORTHERN DISTRICT OF CALIFORNIA

OAKLAND DIVISION

EPIC GAMES, INC., Plaintiff, Counter-defendant, v. APPLE INC., Defendant, Counterclaimant.	Case No. 4:20-cv-05640-YGR-TSH **WRITTEN DIRECT TESTIMONY OF DR. DAVID S. EVANS** The Honorable Yvonne Gonzalez Rogers Trial: May 3, 2021 **Ex. Expert 1**

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I. QUALIFICATIONS

1. My name is David S. Evans. I am the Chairman of Global Economics Group and the Co-Executive Director of the Jevons Institute for Competition Law and Economics at University College London (UCL) where I have been a Visiting Professor since 2004. I have B.A., M.A., and Ph.D. degrees in economics from the University of Chicago.

2. I specialize in the field of industrial organization economics. I have authored, or co-authored, six books and more than 100 widely cited articles. A substantial portion of my research, writing, and teaching over the last 20 years has concerned platforms and the digital economy. A number of my publications concern antitrust economics, including specifically market definition and two-sided platforms. Several of my publications were cited by the Supreme Court in *Ohio v. American Express*, 138 S. Ct. 2274 (2018).

3. Over the last 30 years, I have taught classes on antitrust economics and related topics at the University of Chicago Law School, University College London Faculty of Laws, and Fordham University Law School. I teach graduate courses on antitrust economics of the digital economy and on multi-sided platforms.

4. I have testified before various legislative bodies, federal courts, state courts, and administrative law courts in the U.S. and before the European General Court and the Supreme People's Court of China.

II. ASSIGNMENT & SUMMARY OF OPINIONS

5. I have been asked to address two primary topics: (1) defining the relevant markets for assessing Apple's conduct and Apple's market power in those markets, and (2) assessing whether the restrictions harm competition in those markets.

6. My opinions are the result of empirical studies and qualitative research and are informed by the application of economic principles to the conduct at issue. In forming my opinions I reviewed depositions, documents and data sets produced by Apple, Epic, and third parties; economic and industry literature; and publicly available documents such as industry data and financial filings. These are materials that economists typically rely on to assess antitrust markets, market power and anticompetitive effects.

7. My opinions are summarized below and divided into four main categories:

   i. The digital economy and app ecosystem:

      (A) The digital economy is vast, growing, and heavily reliant on smartphones and apps. Two main developers of smartphone operating systems ("OSs"), Apple and Google act as gatekeepers. (Pages 7-8, 78-79.)

      (B) OSs and app distribution are distinct products with separate demand. Absent restrictions, they are typically offered by

different businesses. (Pages 4-5.)

(C) OSs, including smartphone OSs, are two-sided platforms with significant indirect network effects between users and developers. (Pages 6-7.)

(D) Online marketplaces, including app stores, are also two-sided platforms with significant indirect network effects between users (consumers) and developers (merchants). They compete with single-sided businesses, including direct distribution. (Pages 6-7.)

ii. The relevant market for smartphone OSs and Apple's market power:

(A) The market for smartphone OSs is a relevant two-sided antitrust foremarket. The smartphone OS market has been a duopoly consisting of iOS and Android for at least a decade. This market is global, excluding China. (Pages 11-19.)

(B) Apple has substantial market power over users and developers in the smartphone OS market. Apple faces competition from one differentiated rival, Android, and minimal switching by consumers due to high switching costs. (Pages 19-24.)

iii. The relevant market for iOS app distribution, Apple's monopoly power, and the anticompetitive effects of Apple's conduct:

(A) The distribution of iOS apps is a relevant two-sided antitrust aftermarket. The iOS app distribution market is global, excluding China. (Pages 24-35.)

(B) Prices in the iOS app distribution aftermarket are not constrained by competition between iOS and Android in the smartphone OS foremarket, which is limited for the reasons stated above. (Pages 30-31.)

(C) As a result of contractual and technical restrictions Apple has imposed, Apple's App Store has monopoly power in the iOS app distribution market. Apple has a nearly 100% market share in this market, and it has enjoyed stable pricing and high and persistent profit margins, contrary to Apple's representation to developers that it does not intend to profit from the App Store. Its position is protected by barriers to entry. (Pages 35-39.)

(D) But for Apple's restrictions, there would have been substantial competition in iOS app distribution, consistent with competition in app distribution on macOS, Windows, and Android in China.

(Pages 40-44.)

(E) Insulated from competition, Apple has invested little in app store innovation and has provided limited services to developers, yet has kept its prices high. (Pages 44-55.)

(F) Apple's conduct in the iOS app distribution market has harmed both iOS app developers and iOS users. Specifically, Apple's conduct results in higher prices for developers and users, diminished output, suppressed innovation, and foreclosure of nascent and actual competitors. (Pages 40-57.)

iv. The relevant market for iOS in-app payment processing solutions, Apple's monopoly power, and the anticompetitive effects caused by Apple's conduct:

(A) The online payment processing industry provides specialized and innovative solutions for taking payments online for app. Given choice, app developers often devise their own payment solutions in concert with third-party payment processors. (Page 58.)

(B) Apple's IAP is neither a necessary nor an integrated feature of the App Store. (Pages 58-61.)

(C) There is separate demand for app distribution and for payment solutions for in-app transactions. (Pages 61-65.)

(D) There is a relevant antitrust market for solutions for accepting and processing payments for digital content purchased within an iOS app. It is a single-sided market, and its geographic scope is global excluding China. (Pages 65-69.)

(E) Apple has monopoly power in the iOS in-app payment processing solution market because the developers subject to its IAP requirement have no other payment solution option and no other app distribution option. Apple therefore can and has raised the fees paid by these developers. (Page 69.)

(F) The App Store's payment processing restrictions have harmed competition, raised prices, reduced output, and suppressed innovation for payment solutions for digital content apps in the relevant antitrust market. (Pages 69-76.)

(G) Apple has tied its payment solution to the App Store, and this tie has foreclosed substantial commerce in the iOS in-app payment processing solutions market. (Pages 76-77.)

(H) Apple's requirement that digital content developers process in-app payments through Apple's payment solution is not an economically innocuous metering device or method for collecting monopoly profits. (Page 77.)

III. GENERAL ECONOMIC BACKGROUND

8. In this section, I discuss relevant background on OSs and app distribution, generally and with respect to smartphones. I also discuss two-sided transaction platforms and the dynamics of competition on such platforms. I conclude with a discussion of the app-based digital economy.

A. OSs, App Distribution, and In-App Purchases

1. OSs

9. All computing devices, such as personal computers, smartphones, and game consoles, run an OS. The OS manages a device's memory and other hardware and software resources, and provides services—through application programming interfaces ("APIs")—for other software applications ("apps"). OSs therefore enable third-party businesses—developers—to write apps that run on the computing device. Users can install and use those apps on a device running a compatible OS. Typically, apps are OS-specific: apps written for one OS, such as Windows, do not work on a different OS, such as macOS.

10. "General purpose OSs", which support many different types of apps, emerged around 1980. Over the last 40 years, general purpose OSs have followed a "user pays" business model. The suppliers of all major OSs, including smartphone OSs, provide developers with tools for writing apps at zero or nominal cost. OS suppliers typically profit either directly from OS users—by selling devices that include the OS—or indirectly, by licensing the OS to OEMs that then sell devices to users. Most major OS suppliers that follow the indirect model charged licensing fees to the OEMs; Google provides free licenses for its Android smartphone OS, and then monetizes the OS by selling ads.

2. App Distribution

11. Users value an OS more when they can find more relevant apps for that OS. Developers value an OS more when it allows them to reach more consumers. To drive growth an OS supplier therefore must ensure that users can install applications and that developers can make their applications available for users to install. I refer to this as "app distribution".

12. Across many general purpose OSs over forty years, developers have had diverse choices for app distribution. One distribution channel is for developers to get OEMs to preinstall their apps on the computing devices they make. Another is for developers to maintain websites from which users can download and install apps onto their computing device using a browser. Another channel is through an app store, which is itself an app on the computing device that enables users to browse, search for, download and install apps. Some OSs offer a

pre-installed app store that is bundled with the OS, and most also support third-party app stores that are not affiliated with the OS supplier.

13. App distribution is separate from the OS itself. OS suppliers provide developer tools that allow developers to write apps that users can run on their specific OS—apps such as Quicken for Windows, Photoshop for the MacOS, or Uber for Android. Then, by contrast, app distribution helps developers provide their apps to users of a compatible OS. Intuit, for example, can make TurboTax available to macOS and Windows users for direct download from its website, through online app stores such as Softonics, and through physical retailers such as Staples.

14. App distribution benefits OS suppliers because it encourages users and developers to transact more, thereby encouraging developers to write more apps and consumers to continue using the OS. This case involves a situation in which the OS provider, Apple, has made itself the only distribution path for apps on its OS.

3. In-App Purchases

15. Once an app has been installed on a computing device, the developer and the user can interact directly, by entering into transactions like ordering groceries, renewing a subscription, paying for a ride, or buying artifacts in a game. These transactions are called "in-app purchases". Developers often have payment solutions, including ones they build themselves, that enable them to accept and process payments for these transactions. App stores also offer payment solutions for in-app purchases. This case involves a situation in which the owner of the sole distribution path on an OS, Apple, requires developers to use Apple's own payment solution for all in-app purchases for digital goods.

4. Game Consoles

16. Game consoles, such as Sony's PlayStation, are specialized computing devices for playing games. Since their beginnings in the 1980s, game consoles have adopted a radically different business model from general purpose OSs. Game consoles have a "developer pays" model, in contrast to the "user pays" model of general purpose OSs. In the "user pays" model, OS suppliers subsidize developer tools to encourage the writing of apps, thereby attracting users and maximizing profitable sales of devices or licenses of the OS to OEMs. In the "developer pays" model, by contrast, game console suppliers subsidize the price of the console to maximize console adoption by users, thereby attracting developers, who typically need to make enormous investments in developing games. The platforms then earn a profit from charging game developers for access to the console platform user base, through royalties paid on the sale of games and in-game content. Console games were initially sold as physical media (such as cartridges or CDs) using traditional retailers. Digital stores operated by the console platforms have come to play an increasingly significant role in the sale of games.

5. Competition Among OSs

17. Although all OSs support some third-party apps, not all OSs impose competitive constraints on each other. Different OSs run on different devices, which often are not close substitutes for each other. In fact, users often have several computing devices, which they use for different purposes and in different situations. Developers write apps for different devices to meet the separate consumer demand from each. Below, I consider whether smartphones, personal computers, and game consoles—and their respective OSs—sufficiently substitute for one another to comprise a single relevant market. I conclude that they do not, and that smartphone OSs constitute a separate relevant antitrust market.

18. Likewise, the fact that users and developers can obtain and deliver apps through different distribution channels does not mean all such channels impose competitive constraints on one another and belong in the same market. If consumers use a single OS—either generally or in specific circumstances, such as outside the house—then developers cannot reach them unless they are distributing apps for that OS. Similarly, users cannot get apps that are not available for the OS they want to use. Below, I consider whether smartphone users and developers can rely on other channels of distribution outside of smartphones, and I show that they generally cannot, mainly because apps for devices other than smartphones are not good substitutes for smartphone apps.

B. Two-Sided Platforms

19. Two-sided platforms enable members of two distinct groups to interact with each other, often by entering into exchanges of value. They have "positive indirect network effects", which means that participants on one side of the platform value having more participants on the other side, with whom they can have a mutually beneficial interaction. For example, a ride-sharing application is more valuable to riders when there are more drivers, and more valuable to drivers when there are more riders. When these network effects are significant, the platform owner needs to account for them in its business decisions. Some platforms, for example, adopt pricing models in which they charge one group of participants a low, or even zero price, to attract them to the platform, and charge a positive price to the other group of participants, who want to interact with members of the first group. For example, a restaurant reservation platform typically lets diners make reservations for free, while charging the restaurants.

20. Many two-sided platforms serve as a common intermediary that facilitates a beneficial interaction. Restaurant reservations, ride sharing, credit card payments, and dating platforms are familiar examples. Some economists refer to these as "transaction platforms." But, as the examples above make clear, the two parties do not necessarily engage in a monetary transaction with each other; rather, the platforms match the two parties in an interaction of some sort. That matchmaking by transaction platforms implies significant positive indirect network effects; the larger the number of participants on each side, the more good "matches" can be created.

21. In some cases, such as credit card networks, transaction platforms only compete with other transaction platforms because a platform is the only (or by far the best) way of providing the service to the two groups of participants. In other cases, such as online marketplaces, transaction platforms compete with single-sided businesses. Economists recognize that this hybrid competition occurs commonly in the retail industry, where two-sided online marketplaces, traditional retailers, and direct manufacturer-to-consumer sales commonly co-exist and compete with each other. A consumer can buy Nike running shoes, for example, from the Amazon Marketplace, a two-sided business, or directly from Nike.com, a single-sided one. The competition between two-sided platforms and single-sided businesses demonstrates that in retail, indirect network effects are not decisive in creating value for consumers or suppliers. It also illustrates that two-sided platforms, including transaction platforms, cover a diverse range of businesses, which operate under different circumstances. Sound economic analysis must consider the particular circumstances of the platforms at issue.

22. General purpose OSs are two-sided transaction platforms. They provide a platform on which app users and app developers engage in beneficial interactions, and there are significant positive indirect network effects between users and developers. General purpose OSs can only compete with other OSs because app users and developers must have an OS on which to interact. Given these considerations, the relevant antitrust market for a matter involving OSs should consist of a two-sided market encompassing both users and developers. I understand that is generally the approach taken by the Supreme Court in *Ohio v. American Express* ("*Amex*"), and I consider it to be correct as an economic matter.

23. App distribution is different. Like the retail industry generally, app distribution involves a hybrid model in which two-sided app stores, traditional retailers, and direct-to-consumer distribution can all coexist. This hybrid case is more nuanced than one in which the only competitors are two-sided platforms.

24. Consequently, as described further below, I consider a two-sided platform market for app distribution that also includes single-sided businesses. In the alternative, I consider separate but related single-sided markets involving developers and users. As long as the two-sided features are properly accounted for, economic analysis based on single-sided markets for each side will reach the same economic findings as a two-sided market for both sides. As explained below, I reach the same conclusions in this matter regardless of whether app distribution is analyzed as a two-sided market or as two related single-sided markets.

C. Smartphones, Apps, and Distribution

25. Smartphone OSs are installed, of course, on smartphones. As with other general purpose OSs, suppliers of smartphone OSs typically provide developers with tools to write applications for the OS, and the OSs provide APIs that apps can use to take advantage of the hardware on which the OS is installed. Users can run applications written for the OS on their device. Smartphone OSs have adopted the same pricing model as other general purpose OSs; developers pay at most nominal fees for access to developer tools and the OS provider earns revenue directly or indirectly from users—in Apple's case, primarily from the sale of hardware.

26. There are two main smartphone OSs: Apple's iOS and Google's Android. In the absence of restrictions, smartphone apps could be distributed on these OSs in all the same ways available for other general purpose OSs: through third-party or OS-provided app stores, directly from the developer's website, or through pre-installation on the device. This case, however, involves restrictions on distribution. Specifically, Apple has blocked distribution through any channel other than its App Store.

D. The App-Based Digital Economy

27. Before smartphones became widely used about a decade ago, consumers who participated in the digital economy did so by sitting at a personal computer with a broadband connection. Businesses provided products and services to consumers by creating websites that consumers could navigate to with their browser, or by selling applications that consumers could load and use on their computers.

28. The modern smartphone, with its app-based ecosystem, and the spread of fast cellular broadband around the world, changed that. Most people carry a computer in their pocket, and have broadband Internet connection they can use anywhere, anytime through cellular networks or local Wi-Fi networks. Developers found that native apps—apps written specifically for the smartphone OS—made the best use of the OS and underlying hardware, offering more convenience and better performance than anything they could offer users over a web browser.

29. The scope of today's app-based digital economy is vast and is growing rapidly, accounting for an increasing portion of the digital economy, which is itself growing quickly. It covers many existing industries, is quickly reaching into additional industries, and is creating new ones.

30. People use smartphone apps for a diverse set of personal and work activities. To take a few examples, people use smartphone apps to manage their bank accounts and pay bills, hail rides, communicate with their friends, stream music, find a date, transfer money, order food, and play games. Some use these apps for making a living. Many gig workers, for example, depend on apps for receiving and managing assignments such as ride-sharing, grocery delivery, and meal delivery. Doctors and patients use them for virtual visits.

31. Table 1 reports key statistics on the app-based digital economy for the U.S. Other developed countries are broadly similar, and developing countries are catching up.

Table 1: Key Statistics on the App-Based Digital Economy for the U.S.[1]

Statistic	Value
Percent of Adult Population with Smartphones	83%
Percent of Households with a Personal Computer at Home	89%
Share of Online Time Spent on Mobile	77%
Share of Online Time Spent on PCs	23%
Share of Mobile Time Spent with Apps	89%

IV. MARKET DEFINITION PRINCIPLES

A. General Principles

32. Market definition involves identifying the set of suppliers, and their products, that could provide significant competitive constraints on the conduct at issue. Those suppliers and products identify the area of competition between firms that ultimately determines competitive outcomes—price, output, quality, and innovation. This approach allows economists to assess whether the firm engaging in the conduct at issue has market power that could be used to distort competitive outcomes.

33. Market definition begins with the defendant's challenged conduct and the products or services to which this conduct applies. When done correctly, the economic analysis of market definition yields the same findings regardless of the identity of the complaining party—whether it is a competition authority, a class, or an individual plaintiff. (Economic analysis of plaintiffs may inform other issues, such as whether the plaintiff has itself suffered anticompetitive injury).

34. The economic approach to market definition investigates the extent to which consumers would substitute products to meet their demand. Two products are substitutes if an increase in the price of one product increases the demand for the other product.[2] Substitution is

[1] Nielsen (2019) "The Nielsen Total Audience Report Q1 2019" at p. 20; Nielsen (2019) "The Nielsen Total Audience Report September 2019" at p. 13; Nielsen (2020) "The Nielsen Total Audience Report February 2020" at p. 23; Nielsen (2020) "The Nielsen Total Audience Report April 2020" at p. 12; Statista citing the U.S. Census Bureau, "Percentage of households in the United States with a computer at home from 1984 to 2016," https://www.statista.com/statistics/214641/household-adoption-rate-of-computer-in-the-us-since-1997; PX2725.9; PX2725.7.

[2] The same concept applies to any other dimension that affects the value of the product to consumers, such as quality.

a matter of degree and, for market definition, economists examine whether two products are sufficiently good substitutes that an attempt by one supplier to increase price will result in a significant diversion of demand to other suppliers. Economists use the concept of cross-elasticity of demand to measure the degree of substitution. Poor substitutes have low cross-elasticities of demand.

35. The hypothetical monopolist test (HMT), which is usually operationalized by use of a SSNIP (small but significant non-transitory increase in price) test, helps inform the market definition inquiry. It asks whether a hypothetical monopolist of a set of products could profitably increase prices above a competitive level by a SSNIP. If a SSNIP would cause enough demand to get diverted to products outside the set of products the hypothetical monopolist controls, such that the price increase would not be profitable, then these other products are substitutes that constrain the market power of the hypothetical monopolist and therefore should be included in the market. By contrast, if the hypothetical monopolist can profitably impose a SSNIP above the competitive level, then products outside the set of products controlled by the hypothetical monopolist are not sufficient substitutes and are appropriately excluded from the market. In practice, economists use quantitative and qualitative evidence to assess demand substitution and market boundaries; the HMT can sometimes be conducted qualitatively by asking whether a SSNIP is likely to be profitable given the evidence presented.

36. These same basic principles apply to two-sided platforms, where the issue is whether a hypothetical monopolist could profitably raise prices to participants on one or both sides because participants would not divert demand to other platforms or single-sided businesses. Although special issues arise, economists use the same mix of quantitative and qualitative evidence to assess the economics of substitution and market boundaries for two-sided platforms.

B. Apple's Conduct Related to App Distribution

37. As noted above, market definition begins with the conduct at issue. Here, Apple has imposed both contractual and technical restrictions that together make the App Store the sole distribution channel for iOS apps.

38. Like other OS providers, Apple has provided developers with tools and permissions for developing apps for nominal fees. But Apple, as OS supplier, conditions the use of those tools on contractual provisions that have the effect of blocking app developers from distributing any iOS apps in any way other than through the App Store. Therefore, competing store developers are foreclosed from offering stores for iOS apps, and app developers are foreclosed from using other stores. Apple also technically prevents users from downloading and installing apps directly from developer websites.

39. These restrictions apply to all apps. Therefore, the competitive constraints on Apple's iOS and its App Store would result from the ability of developers and users, overall, to divert their demand to other OSs and distribution platforms. Looking only at one category of demand, such as for games, would not accurately capture the nature of the competition that

these platforms face. It is true that Apple's iOS and App Store customers and developers are heterogeneous, meaning that they may have different substitution possibilities depending on their circumstances. But this is no different from any other business, including other two-sided platforms such as credit card networks.

C. The Foremarket and Aftermarket Framework

40. A "foremarket" is a market in which there is competition for a long-lasting product, such as razors, from which demand for a second product, such as disposable razor blades, is derived. An "aftermarket" is the market for the second product, which is a complement of the first. The foremarket and aftermarket framework provides a sound economic method to analyze the competitive constraints for Apple's conduct involving app distribution.

41. In the foremarket, consumers choose an OS and buy a smartphone that has that OS installed. The initial choice is between OSs, rather than among devices, because iOS and Android have differentiated accompanying ecosystems, and the ecosystem determines a great deal of the consumer's experience with the smartphone; consumers first and foremost choose the ecosystem experience they want. Developers then have to write apps for that smartphone OS to reach users of that OS. As I show below, consumers typically pick the same OS when they replace their smartphones.

42. The chosen OS enables consumers to use apps, and developers to create apps. In the aftermarket for app distribution, consumers with smartphones need ways to get apps, and developers that have created apps need ways to get their apps to consumers.

V. THERE IS A RELEVANT ANTITRUST FOREMARKET FOR SMARTPHONE OSS AND APPLE HAS SUBSTANTIAL MARKET POWER IN THAT MARKET

43. In this section, I define a relevant antitrust foremarket for smartphone OSs and analyze Apple's market power therein.[3] OSs, including smartphone OSs, are two-sided

[3] Apple also bundles a version of iOS with its iPad tablet. My analysis is of smartphone OSs because tablets provide users with different functionality than smartphones—they are generally less mobile than smartphones as a result of being larger and typically lack cellular connectivity. To simplify the exposition, I do not define a relevant foremarket for iOS-based tablets. iPads are, however, relevant in two ways for assessing Apple's market power in the foremarket and aftermarket. First, apps for the iPad and iPhone are both written for versions of iOS (with the iPad version recently renamed as iPadOS) and are developed using the same tools, so Apple's iPad user base strengthens Apple's market power over developers. Second, iPhone users often have iPads, which increases their costs of switching from iPhones to Android smartphones. Apple is the leading seller of tablets with a 52% share of tablet revenue in 2019 globally, including China, and a 67% share considering tablets with average selling prices of $300 or more. PX1055 (summarizing PX2489). The vast majority of its iOS devices, however, are

transaction platforms. The relevant antitrust foremarket is therefore appropriately analyzed as a two-sided platform market in which smartphone OS platforms compete with each other and, at least potentially, other OS platforms.

44. Smartphone OSs, rather than devices themselves, are the relevant foremarket because they are the locus of relevant developer and consumer demand. Developers decide whether or not to write apps for a particular smartphone OS and then get permissions and tools to create those apps, which work on all smartphones with that OS. Consumers make purchasing decisions for smartphones based in material part on the OS for that smartphone and its related ecosystem.

45. Smartphone OSs are bundled with a smartphone because neither works without the other. Analyzing competition for smartphone OSs therefore necessarily requires also considering consumer decisions to buy smartphones, as discussed next.

A. Economics of the Smartphone Business

46. A smartphone consists of hardware, which includes a computing device, and an OS. A smartphone OS does not work without the computing device, and a smartphone does not work without an OS. Much of the value of smartphones derives from the ability of developers to create apps and of people to use them.

47. Since the launch of smartphones in the mid-2000s, some smartphone OS suppliers have sold smartphones that include their OS (e.g., Blackberry, Palm, Apple) and others have licensed smartphone OSs to OEMs (e.g., Microsoft, Symbian, Google). Today, there are two main app smartphone OS ecosystems: iOS and Android.

48. Four main economic features of smartphones, and their OSs, are particularly important for understanding decisions by app users and developers.

i. Smartphones differ from other computing devices because they provide Internet connectivity anywhere via fast cellular connections and Wi-Fi; they are small, lightweight and highly portable; and they include unique and easy-to-use features such as cameras and GPS. These features enable smartphones, and their OSs, to provide users and developers with services that other computing devices, and their OSs, cannot provide.

ii. Consumers typically use only one smartphone OS and its app ecosystem at a time, and often have one smartphone with that OS. Using the terminology of

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iPhones, with iPads accounting for only 13% of its iOS-device sales in Apple's 2019 fiscal year. PX2668.19.

two-sided platform economics, consumers typically "single home" on a smartphone OS.

iii. To use a different smartphone OS than the one on their device, consumers have to buy a new smartphone, and thereby switch to a separate app ecosystem. But users have sunk cost investments in their current smartphone and the ecosystem they are using. They would incur a variety of costs if they were to switch to another smartphone OS. That results in a stable installed base of users on each smartphone OS.

iv. Because users typically "single home" on a smartphone OS, and do not quickly and easily switch, developers typically write apps for all smartphone OSs that have enough users. If a developer did not write apps for a particular smartphone OS, it would not be able to provide smartphone apps to that OS's users, relinquishing a substantial share of the addressable audience for its app. To avoid this, developers typically "multi-home" on smartphone OSs. Today, that means that most significant developers provide apps for both Android and iOS.

I now examine the options that consumers and developers have, respectively, for smartphone OSs, and the implications for the degree of substitution between smartphone OSs and other options.

B. Demand Substitution for Smartphone OSs for Consumers

49. Consumers lack good substitutes—in the economic sense, meaning they would not turn to those alternatives in the face of a price increase—for smartphone OSs. I discuss below the limited extent of (1) substitution between smartphones and other computing devices, and (2) substitution of app usage on a smartphone OS with app usage on other OSs.

1. Substitution between Smartphones and Other Computing Devices

50. As compared to smartphones, other computing devices do not allow consumers to access the Internet anywhere and anytime, are far less portable, and lack key features like an easy-to-use camera and GPS. Generally, an increase in the price of smartphones would not result in consumers materially switching to personal computers or game consoles because they would not be able to do the same things with these devices.

51. Device ownership data confirm that these other devices are not good substitutes for consumers:

i. In the U.S., at least 89% of households have personal computers and 88% of internet-using adults had smartphones, which shows they are not substitutes.[4] If

[4] PX1070 (summarizing PX2747); Statista citing the U.S. Census Bureau, "Percentage of households in the United States with a computer at home from 1984 to 2016,"

personal computers and smartphones were substitutes, consumers would only need one or the other and not both. That the vast majority of adults have chosen to get smartphones even though they already have a personal computer, or access to one, indicates that they are not substitutes.

ii. Most game console owners own smartphones, which shows that they are not substitutes. A 2016 survey found that 96% of game console owners in the U.S. had smartphones while only 29% of smartphone owners also had a game console.[5] If a smartphone were a substitute for a game console, the consumer wouldn't also need to get a console.

52. Consumer purchasing decisions are therefore consistent with people considering personal computers and game consoles as devices they would purchase in addition to, but not instead of, a smartphone. Purchasing these other devices is therefore not a substitute for purchasing smartphones.

2. Substitution between Smartphone OSs for Using Apps, Other OSs, and Web Browsers

53. Consumers cannot easily turn to using apps on non-smartphone OS as a substitute for using apps on a smartphone OS for three broad sets of reasons:

i. Many popular apps that are available on both smartphones and personal computer OSs provide significantly greater benefits to consumers when used on a device that consumers have with them all the time, can access the Internet anywhere, and has features such as GPS and a camera. Examples include Uber, Tinder, Snapchat, Google Maps, and Chase Bank.

ii. Consumers lack substitutes for using their smartphone OS during times when they do not have convenient access to personal computers and game consoles. These includes times away from home as well as situations at home when it is not convenient to go to another room or another family member is using a shared personal computer or game console.

iii. Many apps that are available on mobile phones are not available on game consoles and, in some cases, personal computers. Of the 50 most downloaded iOS game apps on December 31, 2019, only Roblox, Fortnite, Call of Duty, and Mario Kart were available on the three leading game consoles.[6]

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https://www.statista.com/statistics/214641/household-adoption-rate-of-computer-in-the-us-since-1997.

[5] SEA_00026543 at '550.

[6] PX1069 (summarizing DX4883).

54. Consumer behavior is consistent with app usage on a non-smartphone OS being a weak substitute for app usage on a smartphone OS.

i. A substantial majority of users rely on smartphones for many of their online activities. Between 76% and 88% of Internet users in 2019 accessed apps in six app categories only through their mobile devices.[7]

Table 2: Proportion of Worldwide Internet Users Who Access App Categories Using Mobile Devices Only

App Category	Mobile-Only Share
Instant Messengers	88%
Dating	85%
Weather	81%
Coupons/Incentives	79%
Maps/GPS/Traffic	76%
Food	76%

ii. In 2018, 94% of Facebook's monthly active users used the mobile app and, in January 2021, only 1.7% of Facebook's monthly active users only used the web app on personal computers.[8]

iii. Online time spent by U.S. users between 2013 and 2016 increased by 54%, with 97% of the increase accounted for by time using mobile devices, and only 3% accounted for by time using personal computers.[9] Smartphone apps accounted for 80% of the growth.[10]

iv. Over 70% of time watching YouTube came from mobile devices in 2019.[11]

[7] PX1076 (summarizing PX2725).

[8] Statista, "Device usage of Facebook users worldwide as of January 2021," https://www.statista.com/statistics/377808/distribution-of-facebook-users-by-device/; Buffer Social, "2018 Social Media Trends Report," Jan 25, 2018, https://medium.com/social-media-tips/2018-social-media-trends-report-28bf5243b6b9.

[9] PX2767.5.

[10] PX2767.7.

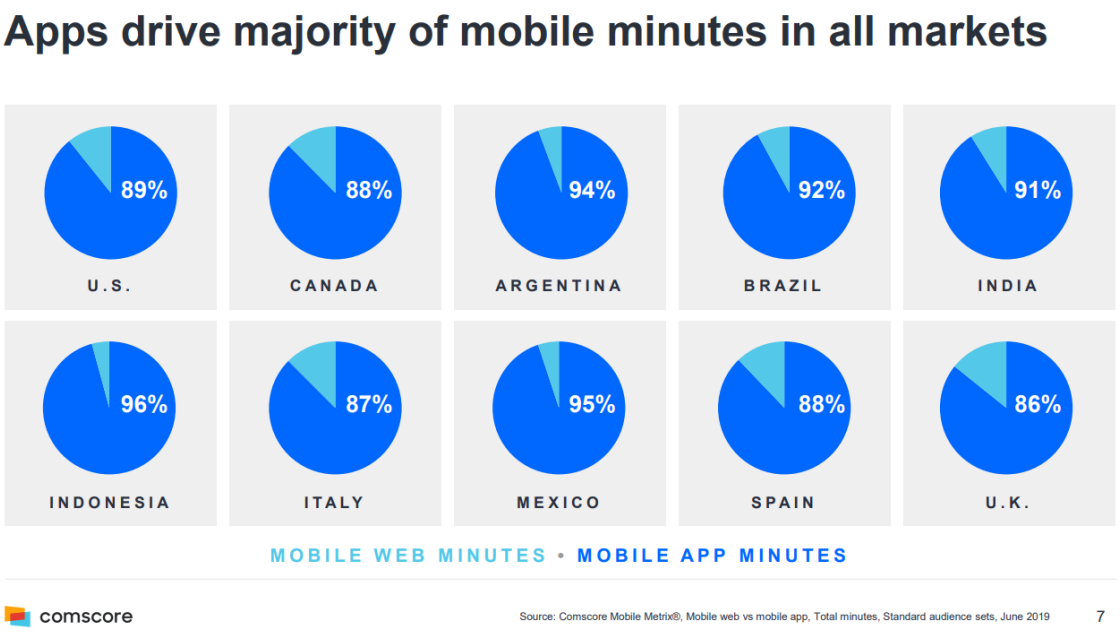
[11] YouTube, "YouTube for Press," https://www.youtube.com/intl/en-GB/about/press/.

v. Personal computers accounted for only 23% of the time Americans spent online in 2019, compared with essentially 100% before the use of smartphones.[12]

55. Consumers cannot easily turn to "web apps" as a substitute for native apps on a smartphone OS. Smartphones have web browsers, which people can use to access websites just as they can on their personal computers, but apps accessed through the browser have inferior functionality and performance. Web apps also often lack features provided by native apps because they cannot access functionality on the smartphone that native apps can. On iOS devices, for example, web apps cannot access Bluetooth, Touch ID, Face ID, ARKit, Contacts, and push notifications.

56. Consumer behavior is consistent with the conclusion that web apps are poor substitutes for native apps. A 2019 report of 10 countries, for example, found that native apps accounted for between 86% and 96% of the time mobile users spent online with only 4-14% coming from using a mobile browser.[13] See Figure 1.

Figure 1: Proportion of Mobile Internet Time Spent on Apps vs. Web Browsers, June 2019



[12] PX1075 (summarizing PX2725).

[13] PX1074 (summarizing PX2725).

57. The evidence on consumer behavior is consistent with consumers perceiving both personal computer OSs and websites accessed from a mobile browser as imperfect substitutes for smartphone OSs that allow them to use native apps.

C. Demand Substitution for Smartphone OSs for Developers

58. Developers cannot meaningfully substitute apps for smartphone OSs with apps for OSs on other computing devices or on websites.

59. Developers create apps to meet or generate consumer demand. They must follow the customer: the only way to meet the demand by customers who use a particular OS is to have an app that runs on the OS that those customers use. This is similar to a national manufacturer's decision to sell in different parts of the country. If it wants to meet the demand of consumers in Oregon it needs to sell its product there. Some consumers might drive to California to get the product if it were sold there, but most would not.

60. This holds true even if the users in question do use other devices at some point in time or for some purposes. The analysis of consumer behavior described above shows that many developers have to follow the customer to their smartphone OSs for each of the following reasons:

i. There are portions of the day during which consumers only have access to their smartphones to use apps over the Internet or would find it inconvenient to use an app that worked on another device they have at home.

ii. Smartphones have unique features—mobility, constant Internet connection, camera, GPS, accelerometers—that developers can use to provide smartphone apps that are superior to apps they can create for OSs on other devices.

iii. Developers cannot create web apps accessible through the mobile browser that are good substitutes to native apps.

61. Evidence on developer behavior likewise shows that apps on personal computers or websites are not substitutes for smartphone apps for meeting consumer demand:

i. The growth of the smartphone app economy depended on smartphones as distinguished from other computing devices—it was driven by a virtuous circle between cellular carriers, handset makers, OS providers, cellular technology firms, and app developers.

ii. Existing developers that operated successful websites on personal computers, which were accessible through mobile browsers, also developed smartphone apps, while continuing to maintain their websites. E.g., Facebook, Match, Twitter, LinkedIn, YouTube, The Wall Street Journal, Spotify, and Hulu.

iii. New developers created successful smartphone app businesses by using unique features of smartphones. E.g., Uber, Instagram, Snapchat, Pokémon Go, TikTok, Tinder, Waze, and WhatsApp.

D. Relevant Antitrust Product Foremarket

62. The relevant antitrust foremarket is a two-sided transaction platform market for users and developers. The market definition analysis is focused on whether smartphone OSs compete with OSs for personal computers, game consoles, or other devices. They do not, and to see why not, it is useful to describe the circumstances under which they could.

63. Hypothetically, suppose that all consumers had personal computers, game consoles, and smartphones and could use all of these devices throughout the day. Consumers could then substitute among devices quickly and easily to the extent these devices had similar features and apps that therefore performed similar services. Under this hypothetical scenario, a developer could decide to offer apps for only a single OS on a single device—a PlayStation, for example—because it could count on consumers having all of those devices and finding the app on the PlayStation to be a good substitute for an app for their smartphone. In this hypothetical world, these other devices with their respective OSs could be competitive constraints on smartphone OSs and might be considered part of the same relevant antitrust market.

64. However, that is not the actual world, and none of those conditions is true. Consumers do not own all these devices in addition to smartphones; virtually all console owners have smartphones, but only a fraction of smartphone owners have consoles. Moreover, even if all or most consumers did have all these devices, they would not have access to them throughout the day. Consumers choose to single-home on their smartphone for many situations and during many parts of the day. Developers cannot meet their demand by creating an app for an OS on another device, or a website, because the consumers will not show up. In addition, many developers cannot meet the demand by creating an app for an OS on another device because their apps rely on functionality that is unique to smartphones, and the same apps on other devices would not be good substitutes for such apps.

65. As a result, smartphone OSs do not face significant competitive constraints from OSs for other devices. Consumers do not find these OSs to be reasonable substitutes for their smartphone OS for many apps they use. And developers therefore do not find these OSs significant substitutes for meeting consumer demand.

66. The HMT provides a way to evaluate the qualitative and quantitative evidence of substitution presented above. Applied to this situation, the HMT for a two-sided platform market asks whether a hypothetical monopolist of a particular set of OSs would be constrained by OSs outside of the hypothetical market from imposing a SSNIP on the total price to users and developers of using smartphone OSs within the market.

67. There is a challenge in applying the SSNIP test here. The incumbent OS providers—Apple and Google—do not charge explicit prices for their OSs. Apple bundles iOS with its iPhones, and Google licenses Android for free and monetizes it through advertising.

That challenge, however, is not insurmountable. It is common practice for economists to determine implicit prices when explicit ones are not available. It is possible to estimate the implicit competitive price for the OS based on license fees—about $30—that Microsoft charged for Windows Phone before it exited. The fees developers pay are small, and they are fixed costs that cover all users, and can therefore be ignored in calculating the total price to app users and developers. It is appropriate to base the SSNIP on the price of the OS rather than the device, because the OS, not the device, is the platform that connects app developers and users and is at the core of the conduct at issue in this case concerns restrictions on app distribution.

68. A 10% SSNIP would result in a $3 increase in the total implicit price. It is not plausible that this increase in price would result in consumers and developers switching to other OSs or to websites given the limitations on substitutability discussed above. The same conclusion would hold for higher implicit prices for the OS and for SSNIPs larger than 10%.

69. I therefore conclude, based on the qualitative and quantitative evidence described above, that the relevant antitrust foremarket consists of the OSs that are installed on smartphones.

E. The Relevant Antitrust Geographic Foremarket

70. The relevant geographic market is global except China. Smartphone OSs are provided globally on smartphones that are sold globally. Apps usually work on smartphone OSs regardless of geography, although sometimes developers customize their apps based on language or other considerations. Therefore, the marginal cost of providing apps in a particular geography is low. Consumers can use smartphone apps from developers located globally.

71. China is an exception. China has erected barriers that limit the ability of users in China to use various non-Chinese apps, limit the ability of OEMs to choose the Google version of the Android OS, and limit developers outside of China from providing apps to Chinese users. Smartphones with the version of Android used in China are generally not sold outside of China, and smartphones that have the Google version of Android are generally not sold in China. That has resulted in a separate smartphone app ecosystem in China. Many of the most popular non-Chinese apps are not available in China, and the most popular Chinese apps have generally not been successful outside of China.

72. I understand that Apple's experts claim that the relevant geographic market should be restricted to U.S. consumers. I disagree, but based on my research, I find that all of my conclusions regarding market power and anticompetitive effects would hold under this narrower geographic market.

F. Apple's Market Power in the Smartphone OS Foremarket

73. In the preceding Sections V.A-V.E, I defined the boundaries of the smartphone OS product and geographic foremarket. In this Section, I discuss whether Apple has market power in this market. I conclude that Apple has substantial market power because the market is a long-standing duopoly consisting of differentiated products, and Apple's share of usage and

revenue in this market is significant. High switching costs for consumers between iOS and Android enhance Apple's market power. Given these switching costs and the lack of technical compatibility of Android apps with iOS, developers cannot substitute Android apps for iOS apps. Finally, there are significant barriers to entry into smartphone OSs.

1. Structure of Smartphone OS Foremarket

74. The smartphone OS foremarket has been a duopoly for the last decade. Of smartphones sold outside of China, smartphones running iOS or Android have accounted for more than 89% of smartphone revenue each year since 2012, more than 99% since 2016, and 100% since 2017.[14] Between 2008 and 2016, the sales of existing smartphone OS providers other than iOS and Android declined sharply and most left the business.

2. iOS and Android Are Differentiated

75. Apple and Google have created highly differentiated ecosystems around their respective operating systems, which limits the competition between them. Almost all Android phones sold outside of China are highly integrated into Google's app ecosystem. They have a Google search bar front and center on the home screen and come bundled with Google apps, usually installed on the home screen, including Gmail, Chrome, Google Drive, Google Maps, and YouTube.

76. iPhones are designed around Apple's suite of apps and services, including iMessage (used in the Messages app), iCloud (used in Photos, Files, Mail, Contacts and other apps), FaceTime, Apple Maps, and the Safari browser.

77. Android and iOS are also differentiated based on the available hardware, the user interface, and how the operating system is controlled. As discussed below, if a user switches from using an iPhone to an Android smartphone (or vice versa), she must replace many of the accessories she uses and learn how to interact with her smartphone using the different operating system.

78. The fact that iOS and Android devices, and their respective operating systems, are highly differentiated products that appeal to well-defined user groups necessarily limits the degree of substitution between them and increases the market power of each.

3. Apple's Share of Smartphone OS Market

79. One measure of share is time spent using a particular smartphone OS. Based on quantitative evidence, as well as statements by Apple, analysts, and individual developers over the last 10 years, I have found that iOS app users account for around 50% of the time smartphone app users spend online and that iOS users have accounted for a disproportionate share of app usage.

[14] PX1059 (summarizing PX2489).

i. From June 2009 to May 2010, iOS had an average 47% share of ad traffic on smartphones,[15] even though its share of smartphone units sold globally, excluding China, that cost $300 or more during 2009 and 2010 ranged from 20-23%.[16]

ii. In April 2010, former Apple CEO Mr. Steve Jobs noted "iPhone has 64% U.S. mobile browser usage share."[17]

iii. In October 2013, Apple announced in an earnings call that iPhone users spent an average of 53% more time per day on their devices than Android users.[18]

iv. Of the new players who created a Fortnite account on mobile between April 21, 2020 (when Fortnite became available on the Google Play Store) and August 12, 2020 (the last full day before Fortnite was removed from the iOS App Store) more than 61% created their account on iOS.[19]

80. Another measure of share is the amount of spending on apps. Between 2015 and 2019, iOS accounted for 50-52% of spending globally (excluding China) and 57-60% of spending in the U.S.[20] The global share of iOS was higher in earlier years.

81. Apple's share of time usage and revenue is much higher than its share of smartphone sales. That is because Apple specializes in selling premium smartphones that appeal to consumers who are more likely to use and spend on smartphone apps. Between 2015 and 2019, Apple accounted for 54-58% of revenues from smartphones priced $300 or more globally excluding China and 62-73% in the U.S.[21]

82. The fact that Apple has a substantial market share in a duopoly market, with differentiated products, implies that it has substantial market power.

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[15] PX2628.6; PX2629.6; PX2630.8; PX2631.8; PX2632.10; PX2633.7; PX2757.13; PX2758.8; PX2759.6; PX2765.13; Admob, "AdMob Mobile Metrics Report," September 2009, p. 7; Admob, "AdMob Mobile Metrics Report," October 2009, p. 7.

[16] PX1061 (summarizing PX2489).

[17] PX2001.3.

[18] PX-2771.

[19] PX2490.

[20] PX1057 (summarizing App Annie (2016) "App Annie 2016 Retrospective," at p. 10; App Annie (2015) "App Annie Index: 2014 Retrospective," at Figure 2; App Annie (2014) "App Annie Index: 2013 Retrospective," at Figure 2; DX5408; PX2296; PX2217; PX2218).

[21] PX1061 (summarizing PX2489).

4. Sunk Costs of Smartphone OSs and Switching Costs for Consumers

83. Substantial switching costs between iOS and Android smartphones enhance Apple's market power. iOS and Android users make sunk cost investments in hardware, software, and learning for their respective ecosystems. A decision to switch OSs is a decision to move ecosystems, meaning consumers would lose the value of these investments and have to make new ones. These costs reduce consumers' incentive to switch.

84. Consider an iPhone user who relies on iMessage. If he switches to an Android phone, he would not only lose access to all prior iMessage communications, but would also lose the ability going forward to communicate using iMessage with other iPhone users going forward, including family and friends. Apple is aware of the lock-in effect this creates for iOS users. In April 2013, Apple executives discussed whether to make iMessage available on Android devices. Craig Federighi, the Apple executive in charge of iOS engineering, said:

> I am concerned the [sic] iMessage on Android would simply serve to remove and [sic] obstacle to iPhone families giving their kids Android phones.[22]

85. In March 2016, Apple Fellow Mr. Philip Schiller forwarded an email chain to Apple CEO Mr. Tim Cook that recounted the difficulties a former senior Apple employee had when he tried for two months to use an Android smartphone in place of the iPhone he had been using:

> And the #1 most difficult to leave the Apple universe app is iMessage. Moving to Android my family was forced to move to Facebook to message me, I used WeChat, WhatsApp and Slack for work, but I missed a ton of messages from friends and family who all use iMessage and kept messaging me at my old address. **iMessage amounts to serious lock-in**.[23] (emphasis added)

86. Apple Senior Vice President, Worldwide Marketing, Mr. Greg Joswiak noted that "we hear this a lot", and Mr. Schiller noted, in forwarding the email chain to Mr. Cook, that "Joz and I think moving iMessage to Android will hurt us more than help us, this email illustrates why".[24]

87. A 2021 New York Times column, which provided advice to readers considering what smartphone OS system to use, summarized the costs of switching.[25]

> When buying a phone, we generally recommend sticking with the same platform your current phone uses. At a minimum, switching entails learning the quirks of

[22] PX2093.1.

[23] PX416.3.

[24] PX416.1.

[25] PX2648.

> a new interface and potentially losing access to purchased apps, app-specific data, or even photo and data services… We generally recommend against [switching smartphone operating systems], though. By the time you've used a phone for a couple of years, you've spent a lot of time learning its quirks, and you've probably invested a decent amount of money into apps, games, music, or videos that you may have to rebuy if you switch.

88. In practice, very few smartphone users switch ecosystems each year. About 20% of iPhone users replace their iPhones each year.[26] Around [redacted] of iPhone users who replace their phones switch to Android.[27] Therefore, only about [redacted]—of the installed base of iPhone users typically moves to Android each year.

5. Developer Ability to Substitute Apps for iOS and Android

89. Most developers treat iOS and Android as independent ways for reaching the two separate parts of the addressable market. By developing apps for both OSs they increase the number of customers they can attract, and their revenues, and secure scale economies. From a developer perspective, iOS and Android are not substitutes because consumers single-home on smartphone OSs, so developers can reach iOS customers only by having an iOS app. Given consumers' sunk costs in the respective ecosystems and costs of switching between ecosystems, an individual developer could not count on many of its iOS customers switching to Android if it dropped its iOS app. Most developers could not forgo having an app for iOS because the app would account for around half of smartphone app demand.

6. Barriers to Entry into Smartphone OSs.

90. There are significant barriers to entry into the smartphone OS market. iOS and Android were able to generate significant indirect network effects between users and developers. That resulted in both operating systems developing a large stock of apps as well as a sizeable installed base of users. That has made it very difficult for entrants to challenge iOS and Android because it would require cracking a difficult chicken-and-egg problem: persuading consumers, who have incurred sunk costs and would have switching costs, to use a new smartphone OS that does not have many apps, and persuading developers to write apps for a smartphone OS that does not have many users. There has been no successful entry into

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[26] PX747.8.

[27] Consumer Intelligence Research Partners, "Apple, Google MUST Collaborate on COVID-19 App," April 10, 2020, at p. 2, https://files.constantcontact.com/150f9af2201/22099883-2dfc-4f20-a5a0-13889875ccd6.pdf; GOOG-APPL-00003609; GOOG-APPL-00003413; GOOG-APPL-00003481; GOOG-APPL-00003522; GOOG-APPL-00003566; PX747.9. I considered loyalty rates from PX747 for 2017-2019. 2020 Q1 had a lower iPhone loyalty rate of 74%. Apple noted that "A smaller base of iPhone owners changing device during these exceptional conditions, possibly with a different profile than normal, could have triggered a higher churn." Churn was markedly higher during February and March 2020. PX747.10. This was likely a consequence of the COVID-19 pandemic.

smartphone OSs since Android in 2008. All the incumbent smartphone OS providers in the late 2000s exited.

91. I therefore conclude that Apple has had substantial market power in the smartphone OS foremarket since 2010, which is a differentiated product duopoly market with substantial switching costs between the two suppliers, and that its market power is protected by barriers to entry.

VI. THERE IS A RELEVANT ANTITRUST AFTERMARKET FOR IOS APP DISTRIBUTION, APPLE HAS MONOPOLY POWER IN THAT MARKET, AND APPLE'S RESTRICTIONS HAVE CAUSED ANTICOMPETITIVE EFFECTS IN THAT MARKET

92. In this section, I define a relevant antitrust aftermarket for iOS app distribution and analyze Apple's market power in that market. App distribution, in the absence of restraints, is typically provided by a mixture of app stores (which are two-sided transaction platforms), single-sided retailers, direct-to-user downloads, and pre-installation. As I noted above, I report results based on a two-sided platform aftermarket that includes users and developers, as well as separate but related single-sided markets for users and developers.

93. I further analyze the anticompetitive effects in this market caused by Apple's restrictions.

A. Background on Launch of iOS and App Store and Apple's App Distribution Restrictions

94. As noted above, the market definition inquiry begins with the defendant's challenged conduct. I describe that conduct here starting with the origin of the App Store.

95. Apple released the iPhone on June 29, 2007. The first iPhone did not support third-party apps. With its attractive handset design and operating system, however, the iPhone attracted substantial consumer demand and developer interest in writing third-party apps.

96. On October 17, 2007, Apple announced that it would enable developers to write apps and would provide them with a software development kit ("SDK"). On March 6, 2008, Apple released an iOS SDK and APIs for core services to developers, making the relevant tools and permissions available to developers for nominal cost.

97. During the March 6 presentation, Mr. Jobs, Apple's CEO, also announced that Apple would create the App Store. He indicated that the App Store would be the exclusive distributor of iOS apps. He said that the App Store would charge a 30% commission on the sale of paid apps "to pay for running the App Store", while distribution of free apps would be free. In response to concerns raised by reporters about the competitive implications of Apple's decision to prevent all commercial distribution through channels other than the App Store, Mr. Jobs stated that "we don't intend to make money off the App Store"; "we are basically

giving all the money to developers here and if that 30% of it pays for running the store, well that will be great".[28]

98. The App Store was launched on July 10, 2008. The New York Times noted, "Mr. Jobs contends that Apple does not plan to make much money on games and other applications…".[29] A month later, The Wall Street Journal wrote, "Apple isn't likely to derive much in the way of direct profit from the business, Mr. Jobs acknowledged. It is keeping only 30% of the proceeds from application sales -- about enough to cover expenses from credit-card transactions and other costs of running the online store -- while the programs' creators keep 70%."[30]

99. The business model that Apple announced to developers was generally consistent with the standard "user-pays" OS model, which seeks not to profit from developer commissions, but rather to encourage developers to create apps that drive user demand, and in the case of Apple to drive the sale of iPhones. Mr. Jobs emphasized that "[t]he developer and us have the same exact interest which is to get as many apps out in front of as many iPhone users as possible."[31] Apple's CFO, Mr. Oppenheimer, stated that the App Store was "a bit" or a "little" over break even in January 2010 and February 2011.[32]

100. Apple required that, as a condition of getting access to the tools and permissions for writing iOS apps, developers use the App Store for "exclusive distribution" and "agree not to distribute [their app] to third parties or to enable or permit others to do so."[33] It also barred developers from offering any app that would provide a distribution channel for users and developers and thereby prevented any other app store from being made available to iOS users. These restrictions remain in place today.[34]

101. As a result, users have to go through the App Store to get apps and developers have no other path to make their apps available to users. By contrast, macOS users can download and install apps from multiple channels and do not have to go through the Mac App Store. I next define the relevant market for analyzing these restrictions.

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[28] PX880.21; PX880.27.

[29] PX2733.

[30] Nick Wingfield, "IPhone Software Sales Take Off: Apple's Jobs," The Wall Street Journal, August 11, 2008, https://www.wsj.com/articles/SB121842341491928977.

[31] PX880.21.

[32] PX2761; PX2709.

[33] PX2123.5; PX2123.8.

[34] PX2558; PX2557.

B. Economic Considerations in Defining Aftermarket for App Distribution

1. Economic Framework for Analyzing Exclusionary Conduct

102. Apple's app restrictions are a type of conduct that antitrust economists refer to as exclusionary and that can result in the foreclosure of competitors from a market. In these cases, antitrust economists assess the anticompetitive effects of the challenged conduct by assessing the extent to which the conduct forecloses other suppliers from the market. Antitrust economists then determine whether the amount of foreclosure causes significant harm to competition and consumers in that market. The relevant antitrust market is important for this assessment because it identifies the existence and degree of competitive constraints from other suppliers that, if present, could limit the competitive effects of the exclusionary conduct.

103. The relevant market for evaluating exclusionary conduct is the one that would exist in the absence of that conduct. To assess that market, in some cases, antitrust economists can look at current competitive conditions because the major effects of the exclusionary conduct are prospective. In other cases, antitrust economists can look at historical evidence on competitive conditions before the exclusionary conduct occurred.

104. Apple's app distribution restrictions were imposed at the same time developers were given tools and permissions to write iOS apps, and therefore before iOS app distribution was practically feasible.[35] It is not possible to observe iOS app distribution in the absence of these restrictions either currently or historically. Fortunately, through my research, I found and collected substantial empirical evidence from adjacent markets where the exclusionary conduct at issue is not present, and that evidence provides reliable indicators of how iOS app distribution would look in the absence of Apple's restrictions, as described below.

2. App Distribution in the Absence of Exclusionary Conduct

105. The economic evidence shows that in the absence of Apple's restrictions, the relevant market for app distribution would include third-party app stores and direct distribution, as well as the App Store.

106. Microsoft and Apple have provided developers with tools and permissions to write apps for Windows and macOS personal computers, respectively, but have not imposed restrictions on the distribution of apps. Apps have accordingly been distributed directly by developers (from the developer's own website) and through third-party stores. Many years after launching their respective OSs, Microsoft and Apple launched their own non-exclusive

[35] Even before the App Store launched, it was possible to install apps on iOS phones that had been jailbroken. To jailbreak an iPhone, the user needs to bypass various restrictions on installing apps that Apple has programmed into the iOS operating system. I am not expressing any opinion on jailbreaking other than that it demonstrates that there was a demand by users, developers, and app stores for alternatives to the monopoly App Store.

stores—the Windows Store and the Mac App Store—which are pre-installed on Windows and macOS computers.

107. I have identified at least 10 third-party app stores that distributed Windows and Mac applications in 2008 when the iOS App Store was launched. Direct distribution was also widely used. Based on a survey of major Windows and Mac apps in 2020, I found that they all distributed their software through multiple app stores and through direct downloads. A survey found that 78% of macOS developers distributed their apps through channels other than the Mac App Store.[36] Microsoft has estimated direct distribution accounts for 83% of personal computer games revenue.[37]

108. There is further evidence in the Android smartphone ecosystem in China, where distribution of Android apps is less restricted than elsewhere. In 2020, there were at least 60 Android app stores in China, including some specialized ones. Large Internet-based firms, such as Tencent and Qihoo 360, and smartphone makers, such as Huawei, operate the largest Android app stores. Chinese Android developers also make extensive use of direct distribution from their websites. Outside of China, multiple Android app stores have attempted to compete with Google Play.

3. Competitive Constraints from Distribution of Apps for Other OSs

109. I do not consider app stores for other OSs to provide direct competitive constraints on iOS app distribution. As a technical matter, app users and developers for one OS cannot use an app distribution channel for another OS because apps are OS-specific. Windows users, for example, could not use a channel that only distributed macOS apps, such as the Mac App Store, because macOS apps do not work on Windows.

110. Even in the absence of restrictions, iPhone users would not be able to use Android app stores because Android apps would not work on an iPhone. Further, for the reasons stated above regarding the limits on substitutability of smartphone OSs and OSs for other computing devices, downloading and installing an app on a computing device other than a smartphone is not typically an alternative to downloading and installing an app on a smartphone—even if the smartphone app were available on the other device, which is often not the case.

4. The App Store as the Hypothetical Monopolist

111. In the absence of Apple's app distribution restrictions, there would be competition in iOS app distribution. To analyze the relevant market, antitrust economists would examine whether a hypothetical monopolist of iOS app distribution would face competitive constraints that would prevent it from raising prices significantly. Given Apple's app distribution restrictions, the hypothetical *and actual* monopolist in this case is Apple, and the

[36] PX2746.

[37] PX2477.17.

issue is whether there are competitive constraints that prevent Apple from exercising monopoly power.

112. In the next part of the analysis, I explain why I have concluded that a hypothetical monopolist of all iOS app distribution would not face material competitive constraints from other channels of distribution or from competition in the foremarket for smartphone OSs. This analysis shows that the App Store has monopoly power in app distribution. I then show that the App Store has earned extraordinary profits, consistent with its having exercised that monopoly power.

C. Relevant Antitrust Aftermarket for App Distribution

1. Economic Effects of Eliminating Competition in Distribution

113. To provide the economic intuition behind my analysis of smartphone app distribution, where Apple has not permitted competition, consider Windows app distribution, where Microsoft has allowed competition. Suppose Microsoft adopted a new policy that required that developers distribute their apps only through the Windows Store and prevented developers from distributing apps directly to users. This would eliminate the many alternatives that Windows developers and users currently have for app distribution.

114. Having eliminated all of these options, Windows would be able to raise the price, or reduce the quality, of distribution services to developers—putting aside for now possible competitive constraints arising from the foremarket. Developers would be unable to tap the demand from the installed base of Windows without going through this monopoly Windows distributor and therefore could not resist the price increase. Developers' only alternative would be to stop distributing Windows apps, which would be unprofitable because it would mean losing access to the Windows installed base of users. Developers could not use the extensive distribution options available for macOS apps because those channels could not provide apps to Windows users. The installed base of Windows users, who have invested sunk costs in Windows-compatible personal computers and the Windows ecosystem, would not have alternatives either and would pay higher prices to the extent developers passed higher fees on to them.

115. Because of Apple's restrictions, the same market dynamics would apply had there been a competitive market for iOS app distribution. The qualitative and quantitative evidence I discuss below shows that the elimination of that competition would enable the hypothetical monopolist to increase the price or reduce the quality of distribution services significantly. Developers would be unable to resist the price increase because the monopoly app store would be the only way to meet the demand of the installed base of iPhone users, and dropping iOS entirely would be unprofitable because developers would lose access to this large installed base of users. Developers would be unable to use Android app stores because they could not provide iOS apps to iPhone users. Users would not have any alternatives, due to the sunk costs and switching costs noted above, and would pay higher prices to the extent developers passed higher fees on to them.

2. Lack of Competitive Constraints from the Smartphone OS Foremarket

116. In theory, competitive constraints could result from the linkage between the foremarket and the aftermarket. To illustrate, suppose hypothetically that in the foremarket app users could easily and costlessly switch OSs. If a Windows user, for example, was not satisfied with app distribution for Windows, she could decide to switch to a Mac, which would enable her to use the macOS distribution channels. Then a developer that had both Windows and macOS apps could reach her through the macOS channels. This same situation could, in theory, be true for smartphone OSs. If a user was not satisfied with iOS app distribution, he could replace his iPhone with an Android phone and use Android distributors. Then a developer that had both iOS and Android apps could reach him through an Android distributor.

117. In analyzing market definition, I therefore consider the possibility that users could substitute between iOS and Android app distribution channels by switching to a smartphone with the other OS. As shown below, however, I find that such switching is too limited to impose meaningful competitive constraints in the app distribution aftermarket. As noted above, this quantification is crucial to the analysis; the question that is meaningful here is not whether *some* consumers would substitute in the face of deteriorating conditions (some marginal consumers almost invariably would), but rather whether *enough* consumers would substitute to constrain the exercise of market power.

118. As a matter of economic theory, significant competition in a foremarket could discipline competition in an aftermarket so that consumers don't face supracompetitive prices, and any high prices in the aftermarket are offset by low prices in the foremarket. However, this theory is based on assumptions that do not apply to the smartphone OS foremarket and the aftermarket for app distribution:

i. There is limited competition in the foremarket. The foremarket for smartphone OSs is a duopoly, with differentiated products, relatively stable market shares, and infrequent switching between firms. Economic models and empirical evidence relied on by modern industrial organization economists show that these features weaken competition.

ii. Users have made substantial sunk cost investments in smartphone OS ecosystems, and would incur high switching costs should they decide to move to a different smartphone OS, which severely reduces the effect on the aftermarket of competition in the duopoly foremarket.

iii. App distribution costs are low relative to the overall costs of smartphones, related hardware and apps. A 10% increase in App Store commissions, even if fully passed through to users, would result in only a 0.77% increase in their total cost of having an iPhone and using apps.[38] Given sunk costs and switching costs

[38] This is based on a 10% increase in App Store commissions relative to the revenues that Apple received from App Store commission and iOS device sales.

it is not plausible as a matter of economics that an increase of this magnitude would result in iPhone users switching to Android phones.

iv. The lifecycle costs of apps are hard for consumers to calculate and compare across smartphone OSs. iPhone users cannot easily estimate the impact of app distribution costs on the relative lifecycle costs of using an iPhone versus an Android phone. Nor can they determine whether price increases for iOS apps result from decisions by developers, which would be the same regardless of the OS they use, or decisions by Apple that affect the aftermarket. This is particularly so given that consumers use a wide range of apps that may change over time, the fact that app distribution costs are low relative to the overall costs of smartphones, and the uncertainty about the extent to which developers pass on those costs.

3. Relevant Antitrust Aftermarket for App Distribution Is Either A Single-Brand or Two-Brand Market

119. The economic findings summarized above (and further discussed below) demonstrate that there is a relevant aftermarket for iOS app distribution. iOS users and developers cannot use Android app distributors. There is insufficient competition in the foremarket between iOS and Android to discipline competition in the aftermarket. Apple has a monopoly in this market in the same way Windows would today if it eliminated the extensive competition in distribution for Windows. This is a single-brand market because distribution alternatives for the second OS brand do not provide a significant competitive constraint in the aftermarket or through the foremarket.

120. Nevertheless, even if one considered a two-brand market for iOS and Android app distribution, the economic findings above would demonstrate that the App Store has substantial market power in this two-brand market for the same reasons it has monopoly power in the single-brand market. Android distributors would not impose a significant competitive constraint on the App Store. Foremarket competition between iOS and Android would not impose a significant competitive constraint either. As a result, my analysis of competitive effects for Apple's app-distribution restrictions would apply in an app distribution market for either a single-brand market for iOS app distribution or a two-brand market for iOS and Android app distribution.

121. The relevant antitrust aftermarket for iOS app distribution is a two-sided platform market for iOS app users and iOS app developers. In the competitive market that would exist absent Apple's app distribution restrictions, competition would take place between app stores, which are two-sided online marketplaces. iOS app developers could also distribute apps directly. I include this single-sided alternative for iOS app developers and users in this two-sided market.

122. Given that iOS app distribution would involve hybrid competition between two-sided and single-sided firms, I have also considered single-sided markets. Based on the considerations above, one can define a single-sided market for iOS app distribution for users

and a single-sided market for iOS app distribution for developers and take into account the relationship between them. For the reasons stated above, both users and developers would lack significant substitutes. As a result, competition in the foremarket would not constrain prices in either aftermarket.

123. I provide further economic analysis and evidence in support of my conclusions on the relevant antitrust aftermarket below. This includes two empirical analyses I conducted, one based on Epic Fortnite user data and one based on a survey conducted in this matter by Dr. Peter Rossi.

4. Empirical Study of Switching by iOS Fortnite App Users Following Fortnite's Removal from App Store

124. Using Fortnite user data, I have conducted several empirical studies that confirm key conclusions concerning foremarket and aftermarket competition in this matter. My analysis is based on a large random, anonymized sample of Fortnite accounts. The U.S. and global estimates are similar and, for convenience, I report the U.S. ones here.

125. Because Fortnite has been available for smartphones, personal computers, and game consoles, Fortnite provides evidence on the outer limits of substitution possibilities for iOS app users and developers. Most other iOS apps are not available on as many devices; indeed, many iOS apps are not suitable for use on any device other than a smartphone.

a. Fortnite User Single-Homing

126. Most Fortnite users play all or nearly all of their game minutes on a single platform. Of accounts with positive all-time game minutes, 82.7% have played Fortnite on only a single platform. The same pattern holds among players who use iOS as their primary platform—90.9% of those players have only used iOS.[39] This means there are basically two types of players who used the iOS Fortnite app: those who predominantly used iOS, and those who predominantly used game consoles and personal computers but occasionally used the iOS app. Neither type of player engages in material substitution between playing Fortnite on their iPhones and playing on another device.

b. Consumer Substitution

127. Apple removed the Fortnite iOS app from the App Store on August 13, 2020 and made it impossible for existing users to update their Fortnite app and therefore play the new season of Fortnite, released two weeks later. This episode can be used as a natural experiment to analyze whether removal, and degradation in quality, of the Fortnite iOS app causes Fortnite iOS players to substitute to game consoles or personal computers at numbers sufficient to constrain Apple's market power. I compared the 10-week periods immediately before and immediately after August 13, which I call the "pre-period" and the "post-period".

[39] PX1054 (summarizing PX2873).

128. I used a standard econometric method known as differences-in-differences to compare the behavior of Fortnite players who only used iOS before August 13 with a control group of Fortnite players who used only game consoles or personal computers. The U.S. players who played only on iOS in the 32 weeks ending August 12 accounted for 60.7% of all U.S. minutes played on iOS devices over that time period. To ensure I had a proper control group I used econometric methods to match each iOS app player with a console or personal computer player who exhibited the most similar behavior over the same 32-week period.

129. I observed that U.S. iOS-only players substituted 16.7% of the minutes they would have played on iOS in the post-period to non-iOS devices.[40] That estimate of switching is an upper bound: even in the absence of the removal of Fortnite from iOS, over time some iOS-only players, like consumers in general, decide to buy game consoles and personal computers that can run Fortnite. When they do, their game play on consoles and personal computers increases. More consumers have decided to get game consoles than normal during the pandemic, which has been in effect during the time period relevant to the comparison. Controlling for this cross-progression to personal computers and consoles, I found that U.S. iOS-only players in the pre-period substituted only 3.1% of their Fortnite minutes to game consoles and personal computers after they could not effectively use the iOS version of Fortnite.[41]

130. This result confirms that even when using an iOS app that is available across platforms, most iOS users do not find that using the app on other devices is a good substitute.

c. Developer Substitution

131. I used the same econometric approach to examine whether Epic, as a developer that has already invested in making its Fortnite app available across multiple devices and their OSs, would find it profitable to drop its iOS app, in the face of a price increase. Epic could do that if enough of its iOS app users switched to game consoles or personal computers, such that it would recoup enough lost revenue from iOS on those other platforms. As discussed above, very few users would switch their gameplay time to other platforms. Because developers likely focus primarily on game spend rather than gameplay time, for this analysis, which focuses on Epic, I focused on revenue.

132. Analyzing the same Fortnite data described above, I found that U.S. iOS-only app users shifted only 30.7% of the total spending they would have made on iOS in the post-period to consoles and personal computers. Accounting for the cross-progression to game consoles and personal computers, that number falls to 16.3%.[42] To be conservative I calculated an upper bound on the amount of iOS revenue that would move to other devices based on the assumption that (i) 100.0% of the revenue generated on iOS from players who made purchases on iOS and other devices in the pre-period (who accounted for 35.0% of U.S. iOS revenue over

[40] PX1080 (summarizing PX2873).

[41] PX1080 (summarizing PX2873).

[42] PX1079 (summarizing PX2873).

that time period) would shift to consoles or personal computers; and (ii) 16.3% of the revenue generated from U.S. players who made purchases only on iOS in the pre-period (who accounted for 65.0% of U.S. iOS revenue over that time period) would shift in the post period to other device. That gave me an upper bound of 45.6% of revenue that moved from the iOS Fortnite app to non-iOS Fortnite apps.[43]

133. Using data on Epic's average profit margin I calculated the proportion of spending that would have to move from the iOS Fortnite app to non-iOS Fortnite apps to make it profitable for Epic to drop the Fortnite iOS app in response to a 10% increase in Apple's App Store commission. I found that Epic would not find it profitable to terminate its iOS app and focus on other OSs unless 87.7% or more of its iOS revenues migrated to other platforms. Because the upper bound of 45.6% is much lower than the critical level of 87.7%, I conclude it would not be profitable for Epic to drop the iOS app in response to a SSNIP in iOS app distribution. These results would be even more dramatic if I relaxed the conservative assumptions made above or if I considered apps other than Fortnite, the vast majority of which are not as readily available for use on both consoles and personal computers.

134. This result confirms that even an iOS app developer that has already invested in developing its app for non-smartphone OSs cannot sacrifice the profits it would lose if it were to exit iOS and lose access to iPhone users. The result also confirms that the foremarket does not include OSs for non-smartphone devices from the standpoint of developers.

135. I now turn to the results of my second empirical study.

5. Survey Evidence of Consumer Behavior in Response to App Store Price Increase

136. Another Epic expert, Dr. Peter Rossi, conducted a survey of consumers who had iPhones and iPads and had purchased in-app content in the previous thirty days. The survey, which was conducted in January 2021, resulted in 2,338 usable responses. After carefully determining how much consumers had actually spent in the previous 30 days, the survey asked consumers how they would respond if they would have to pay 5% more for the content they had purchased in the preceding 30 days, and assuming that Google Play did not change its fees. Although respondents were not told this, the 5% increase would correspond to the situation in which the App Store increased the average commission rate to developers from 27.7% to 35.9% and those developers passed on 50% of their costs. The survey question therefore poses a much larger increase in price than the standard 5%-10% used in SSNIP tests and therefore would lead to much greater substitution than had a lower price increase been used.

137. Dr. Rossi's survey found that 74.0% of spending-weighted respondents would not reduce their spending and that 98.6% of spending-weighted respondents would not respond by switching to an Android device. It found 24.7% would have reduced their spending by a weighted average of 38.9%. It found that the spending-weighted average elasticity of demand

[43] PX1079 (summarizing PX2873).

for IAP spending with respect to the consumer price is -2.19, which reflects a relatively low level of price responsiveness.[44]

138. These results are consistent with the other evidence reported above that foremarket competition between iOS and Android devices would not constrain a hypothetical monopolist of iOS app distribution in the aftermarket because most users would not switch from iOS to Android even if faced with a significant, permanent price increase in the price of their apps.

6. The HMT Framework Also Confirms that iOS App Distribution Is a Relevant Antitrust Aftermarket

139. Using the results of the empirical studies above, I have used the hypothetical monopolist test as a further check on my conclusion that the relevant antitrust aftermarket is iOS app distribution. I follow a standard approach, based on the economic literature on two-sided platforms, by considering SSNIPs on both sides separately and then considering the overall effect.

140. Consider the situation in which a hypothetical monopolist of iOS app distribution imposed a SSNIP on developers. A few app developers—primarily console game developers and video and music streaming services—are similar to Epic in that they also have some apps that have versions that run on consoles, personal computers and smartphones. The vast majority of game and non-game developers, however, do not create apps for consoles, and many develop apps only for mobile OSs. Epic's experience therefore provides a highly conservative prediction of whether app developers have sufficient non-smartphone substitutes to resist a price increase. As shown above, using a standard critical loss analysis based on diversion to substitutes, I found that distribution on game consoles and personal computers was not a substitute even for a multi-platform app such as Fortnite, because it could not profitably resist a price increase by dropping its iOS app.

141. For this analysis, consider a situation in which a hypothetical monopolist of iOS app distribution imposed a SSNIP on consumers. Dr. Rossi's survey shows what would happen if the putative monopolist, the App Store, increased the prices App Store users paid for apps by 5%; as noted above that would follow from a SSNIP on commissions charged to developers of more than 30%, when half of those fees are passed on App Store customers in the form of higher prices. The low elasticity determined from the survey means that imposing this price increase would be profitable for Apple, because the increased profits from higher commissions to iOS app developers, which result in higher prices to iOS app users, would outweigh any loss in profits from iOS app users switching to Android phones or reducing their App Store

[44] PX1078 (summarizing PX2545).

purchases.[45] I found that Apple could have increased its profits by $824.9 million by imposing this price increase.

142. In theory, the App Store, as the monopolist, should already be charging the highest commission rate it can and should not be able to increase fees more. In practice, it is likely that Apple has not increased its commission rate over the current 30% maximum given the high level of regulatory, media, and developer scrutiny it has faced for several years.

143. Given the monetization strategy adopted by Apple for the App Store, the commission is a two-sided price for interactions between iOS app users and developers. The extent to which these two groups bear that total price depends on how much developers pass on to consumers the commission rates they pay to Apple. A hypothetical monopolist of iOS app distribution could profitably increase this two-sided price by a SSNIP over competitive levels because it would not lose much consumer demand, including from switching to Android smartphones. It would likewise not lose developers, which would not be able to forgo access to the installed base of iOS app users, which account for a large part of demand.

144. These results confirm that there is a relevant two-sided aftermarket for iOS app distribution and, in the alternative, two relevant separate but related one-sided aftermarkets for iOS app distribution for iOS app developers and iOS app users.

7. Relevant Geographic Market for iOS App Distribution

145. The relevant geographic market for analyzing the distribution of iOS apps is global but I have excluded China to make the geographic market for the aftermarket conform with the foremarket. (In the absence of Apple's restrictions on the ability of third parties to distribute iOS apps, competition among iOS app distributors in China may differ from competition outside of China for related reasons to why smartphone OS competition is different in China.) My conclusions would not change if China were included in the geographic market. The standard concern with defining a geographic market that is too narrow is the exclusion of competitors that are located outside the candidate geographic market that could provide competitive constraints on firms inside the candidate geographic market. Because Apple is the only distributor of iOS apps in all countries, there is no potential competition to the App Store from firms inside China, any more than there is from firms outside China. For similar reasons, if the geographic market were restricted to the U.S., as Apple's experts have proposed, the App Store would have market power in that narrower market as there is no potential competition to the App Store from U.S. firms.

D. Apple's Market Power in App Distribution

146. In the preceding Sections VI.B-VI.C, I defined the boundaries of the iOS app distribution product and geographic aftermarket. In this Section, I discuss whether Apple has market power in this market. I conclude that Apple has monopoly power because it has a nearly

[45] I have confirmed this result using pass-through rates over the range of plausible pass-through rates.

100% market share in this market, it has enjoyed stable pricing and high and persistent profit margins over time, and there are barriers to entry into the relevant market.

147. Despite Apple's claim that it would operate the App Store on a break-even basis, it soon earned profit margins that are very high relative to reasonable competitive benchmarks. It has been able to earn these high profits because it has had, and continues to have, monopoly power over iOS app distribution. That power is not constrained by other iOS app distributors because none exist—the App Store has effectively a 100% share in the iOS app distribution market. And, as discussed above, it is not constrained by competition in the foremarket because iOS app users have sunk costs, and switching and information costs, and developers have no choice but to distribute iOS apps to reach the large, stable installed base of iPhone users.

148. My first analysis of the App Store's profits is based on App Store profit and loss statements ("P&Ls") available to me prior to the submission of my opening expert report and Apple Rule 30(b)(6) testimony about those documents. The second analysis is based on Apple profitability analyses that Apple first produced the day before my opening report was due, and which I disclosed in a supplemental statement prior to my deposition. My analysis relies in part on financial analysis conducted by Mr. Ned Barnes, an expert for Epic in this matter.

1. App Store P&Ls Based on App Store Presentations Made to Senior Apple Executives

149. My discussion of App Store financials is based on Apple's fiscal years. [redacted]

150. The App Store, like other online marketplaces, books revenue based on commission fees rather than the sales to consumers. To compare the App Store's margin with a reasonable competitive benchmark, I asked Mr. Barnes to obtain profit data on stores that operate online marketplaces for consumers and merchants. These businesses provided the best available benchmark because they are online marketplaces like the App Store and calculate profit margins on a comparable basis. He identified five large publicly traded stores that operate primarily as online marketplaces for which there was sufficient public data to make profit comparisons: Alibaba, eBay, MercadoLibre, Rakuten, and Etsy.

151. Table 3 reports the profit margins for these online marketplaces for 2013-2019. The median margin among these online marketplaces, calculated in the same way as the App Store margin, was 21.4% during this time period. The App Store margin in 2019 was [redacted] times

[46] PX1049 (summarizing PX610; PX602; PX608). Apple has claimed that there were certain "direct costs" and corporate overhead expenses that were not accounted for in these Apple profit margin estimates. Accounting for the claimed direct costs would lower the profit margin only slightly, to 81.3% in 2019 and, as reported by Mr. Barnes, accounting for the claimed corporate overhead would also result in a minimal addition reduction, to 79.6% in 2019. Even if such adjustments were appropriate, this would not have a material impact on my conclusions.

the median margin for this benchmark. The highest profit margin in any year for the five online marketplaces was for Alibaba, at 50.5% during 2016. The App Store margin therefore was [redacted] times the highest margin hit by any of the five benchmark marketplaces.

152. Apple provided financial statements for 2018 on a similar basis as for 2019. It also provided financial statements for 2013-2015.

Table 3: Operating Margin (Percent) for Online Marketplaces, 2013-2019[47]

Marketplace	2013	2014	2015	2016	2017	2018	2019	Median (across years)
Apple App Store	[redacted]							
eBay	29.7%	28.2%	25.6%	25.0%	22.8%	20.7%	21.5%	25.0%
Etsy	0.6%	-3.2%	-0.7%	4.8%	2.7%	12.4%	10.8%	2.7%
Alibaba (Core Commerce Segment)	NR	49.2%	47.4%	50.5%	44.3%	29.9%	29.4%	45.8%
MercadoLibre	32.5%	21.6%	21.4%	21.4%	11.7%	-4.8%	-6.7%	21.4%
Rakuten	15.1%	17.5%	16.6%	8.1%	13.3%	14.3%	10.1%	14.3%
Median (across firms excluding Apple)	22.4%	21.6%	21.4%	21.4%	13.3%	14.3%	10.8%	21.4%

2. App Store P&Ls Produced on February 15, 2021

153. [redacted] Figure 2 reproduces the chart Apple prepared.

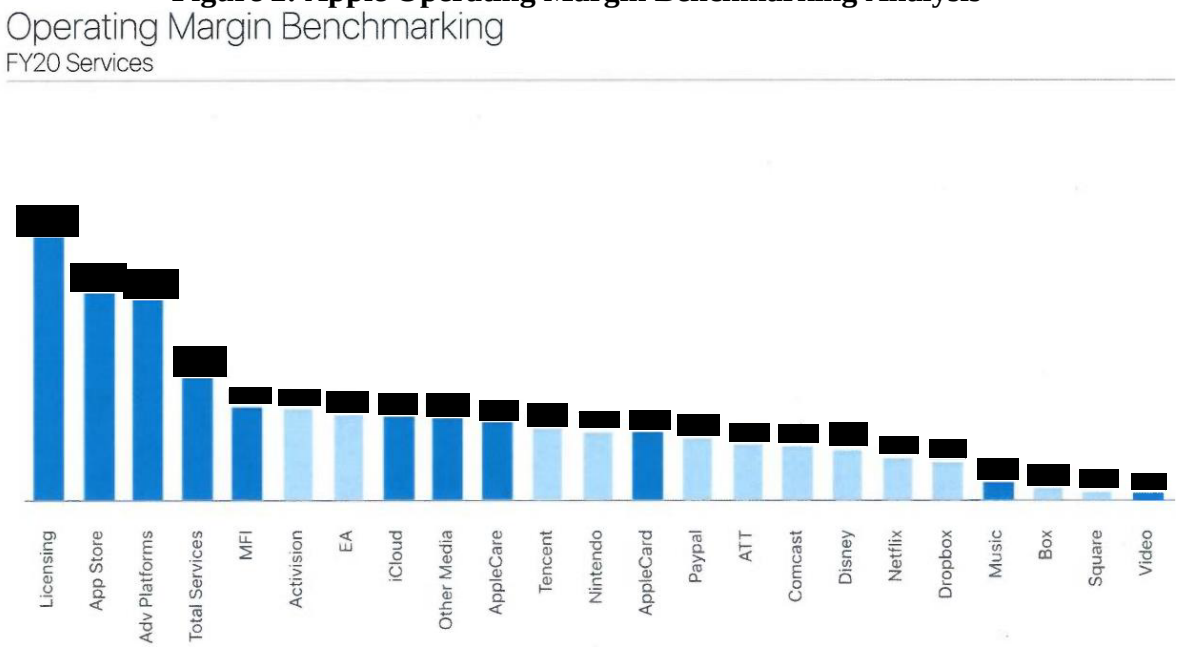
[47] PX1066 (summarizing U.S. SEC Filings for years ended 2012-2020; Rakuten Financial Results Supplementary Material Appendices for years ended 2015-2019; PX602; PX608; PX610; PX2302).

[48] PX2385.18.

[49] PX2392.3.

[50] PX2392.3.

Figure 2: Apple Operating Margin Benchmarking Analysis[51]



154. I understand that Apple has argued that profit margin is not a meaningful metric for assessing its market power because it considers the allocation of joint costs to the App Store to be an arbitrary exercise. [redacted][52]

155. Apple's financials also confirm that the App Store is a distinct entity within Apple. It is not treated as an integrated part of the iPhone business. Rather, it is shown in the financial documents on the same footing within the organization as the iPhone, Mac, AppleCare and Apple Music.[53]

3. Apple's Pricing

156. The App Store has earned profits mainly by requiring that developers use IAP for in-app purchases of digital content if they want to distribute their iOS apps through the App Store. It charges a commission on those transactions. The App Store also distributes apps at no

[51] PX2392.3 (excluding entities with negative margins).

[52] PX2385.24.

[53] PX2392.2-PX2392.3; PX2385.8; PX2385.17-PX2385.18.

charge. Apple has maintained roughly stable prices despite the sharp increase in app distribution, rising profits, and high profit margins.

157. Using Apple data on App Store transactions, I have calculated that the average commission on in-app purchases has declined only slightly over time, mainly as a result of reducing the commission on subscriptions to 15% after the first year. Table 4 reports the average commission for 2013-2019. It also reports the average profit margin based on the data from Table 3 above.

Table 4: Apple App Store Operating Margin and Average Commission, 2013-2019[54]

Year	Operating Margin	Average Commission
2013	[redacted]	29.8%
2014		29.9%
2015		29.8%
2016		29.2%
2017		28.4%
2018		28.0%
2019		27.7%

Notes: NR denotes not reported.

158. In the next section I will show that competition in app distribution would have competed away some of Apple's high profits and resulted in developers paying lower commissions.[55] That analysis demonstrates that by having a monopoly in iOS app distribution, Apple can charge supracompetitive prices and earn supracompetitive profits. It therefore confirms that Apple has, and has exercised, monopoly power.

4. Barriers to Entry

159. Apple's monopoly power in app distribution is protected by barriers to entry. As a result of its substantial market power in the smartphone OS foremarket, Apple is able to block developers from distributing apps through channels other than the App Store and block other app stores from distributing apps that users could download and install. That results in an insurmountable barrier to entry into the iOS app distribution aftermarket.

[54] PX1050 (summarizing PX2306).

[55] To compare prices, I assume that competing app stores would also tie payment solutions for in-app purchases and charge commissions on those purchases. With competition, however, other monetization models could emerge.

E. Apple's App Distribution Restrictions Have Caused Anticompetitive Effects in the iOS App Distribution Market

160. To analyze the competitive effects of Apple's app distribution restrictions in the iOS app distribution market, I have compared the actual world with these restrictions to the but-for world without them. For the but-for world, I have assumed that (i) Apple continues to install the App Store on every iPhone and operates it as it does now; and (ii) Apple continues requiring that certain apps use its IAP payment solution for in-app purchases as a condition of obtaining app distribution services and continues earning revenue by charging commissions on those purchases.

161. However, in the but-for world I have assumed that other stores would have been able to offer distribution of iOS apps and developers could distribute directly. So that I have a common metric for comparing prices with and without the restrictions, I assume other app stores also charge commissions. Of course, the particular details of how the App Store, and other app stores, earn revenue, including from in-app purchases, could change with competition.

162. Based on my comparison to a but-for world where Apple's restrictions do not exist, I have concluded that:

i. there would have been substantial entry by competing third-party app stores into iOS app distribution as well as direct distribution by developers;

ii. competition would have resulted in substantially lower prices as measured by commissions, which would have benefited iOS app developers and users;

iii. competition would have resulted in developers and users receiving more and better iOS app distribution services and more innovation in those services; and

iv. competition would have curtailed Apple's ability and incentive to disadvantage third-party apps that compete with its first-party apps on the iPhone.

Apple's app distribution restrictions therefore harmed competition in the iOS app distribution market and caused iOS app users and developers—the two groups of customers that participate in that market—to pay higher prices and to receive less output, lower quality, and less innovation.[56]

[56] The economic evidence is also sufficient for me to conclude that Apple's app distribution restrictions harmed competition in the alternative related single-sided markets for iOS app distribution for developers and users and in the alternative single- and two-sided markets for app distribution that include Android.

1. Foreclosure of Competition

163. I have concluded that in the absence of Apple's distribution restrictions, there would have been substantial competition in the iOS app distribution market, including direct distribution, based on eight empirical findings.

164. The first finding is that competition is the norm in retail distribution, whereas monopoly is not:

i. App stores are a type of retail distributor that operate as online marketplaces. Retail distribution, whether operated on the basis of a two-sided or single-sided business model, and whether online or physical, tends to have competing stores. Scale economies and indirect network effects are not large enough to result in high concentration. In fact, sellers often engage in direct distribution that puts competitive pressure on retailers and demonstrates that scale and indirect network effects are not sufficiently large to be determinative of competitive outcomes.

165. Empirical findings (ii)-(iii) show that entry would have occurred in the absence of restraints because this has occurred for smartphone OSs that have not blocked app distribution.

ii. As of 2020, there were at least 60 Android app stores in China, where there are no material restrictions on entry. Table 5 lists stores that had more than 20 million monthly active users. Android smartphones in China typically have a pre-installed app store operated by the OEM and Chinese consumers can install other app stores. The large app stores distribute the full range of apps. Some small stores specialize in particular types of types of apps. Direct distribution of smartphone apps from developer websites is widely used by app developers and app users.

Table 5: Top App Stores in China[57]

App Store	Company	Monthly Active Users (Millions)
Tencent MyApp	Tencent	271
Huawei AppGallery	Huawei	157
360 Mobile Assistant	Qihoo 360	113
OPPO Software Store	OPPO	112
vivo App Store	vivo	87
MIUI App Store	Xiaomi	81
Baidu Mobile Assistant	Baidu	66
4399	4399 Network	31
Anzhi Market	Anzhi	29
China Mobile MM Store	China Mobile	24
TapTap	TapTap	21

iii. There were third-party app stores for the early smartphone OSs—Symbian, Blackberry, Windows Mobile, and Palm—that did not exclude third-party stores. GetJar, Mobango, and Handango offered apps for all four platforms;[58] Handster provided apps for BlackBerry, Symbian and Windows Mobile;[59] PocketGear

[57] PX1084 (summarizing PX2659; PX2660).

[58] MobiForge, "The open market approach: Q&A with GetJar, the No1 independent app store," August 1, 2020, https://mobiforge.com/news-comment/the-open-market-approach-q-a-with-getjar-no1-independent-app-store; GetJar, "Search Software," January 30, 2008, https://web.archive.org/web/20080130014627/http:/www.getjar.com/software/; Mobango, "Compatibility," as rendered on July 2, 2008, https://web.archive.org/web/20080702172738/http://www.mobango.com/compatibility/; Handango, "Handgano," as rendered on January 22, 2008, https://web.archive.org/web/20080122043252/http://www.handango.com/home.jsp?siteId=1.

[59] Handster, "Handster, as rendered on December 29, 2007, https://web.archive.org/web/20071229215607/http://smartphone-software.handster.com/; PR Newswire, "Handster Leads Android Independent Stores," June 27, 2011, https://www.prnewswire.com/news-releases/handster-leads-android-independent-stores-124587493.html.

provided apps for Palm, Blackberry and Windows Mobile;[60] and PalmGear offered apps specifically for Palm OS.[61]

166. Empirical findings (iv)-(v) show that six large companies have actively sought to distribute iOS apps, but Apple has blocked them from doing so.

iv. In the last three years, Apple has blocked at least five developers—Amazon, Facebook, Microsoft, Google, and Nvidia—on the basis that they submitted apps that distributed third-party apps. Table 6 summarizes these "app stores", Apple's reason for blocking them, and how the developer had to modify them to secure distribution.

Table 6: Summary of iOS "App Store" Gaming Apps Rejected by Apple[62]

App Store	Apple's Reason for Blocking the App	Modifications Required to Secure Distribution
[1] Amazon FreeTime	Store within a store	Removed games
[2] Facebook Gaming	Code distribution cannot be the main purpose of the app	Removed games
[3] Microsoft xCloud	Multiple game apps cannot be included within a single app	Distribution never secured. Apple required each game in the service be distributed separately through the App Store
[4] Google Stadia	Multiple game apps cannot be included within a single app	Removed games and in-app purchases
[5] Nvidia GeForce NOW	Multiple game apps cannot be included within a single app	Distribution never secured. Apple required each game in the service be distributed separately through the App Store

v. The Epic Games Store sought permission from Apple to distribute iOS apps for the iPhone. Apple refused to allow this.

[60] Pocketgear, "Pocketgear," as rendered on October 6, 2008, https://web.archive.org/web/20081006192330/http://pocketgear.com/. Following the closure of PalmGear in 2007, users were redirected to PocketGear.com. See Palm Infocenter, "PalmGear Now Officially Retired," November 29, 2007, http://www.palminfocenter.com/news/9529/palmgear-now-officially-retired.

[61] Leena Rao, "PocketGear Rebrands to Appia; Shifts to White-Label App Marketplace Platform," TechCrunch, February 3, 2011, https://techcrunch.com/2011/02/03/pocketgear-rebrands-to-appia-shifts-to-white-label-app-marketplace-platform/

[62] [1] PX2126; APL-APPSTORE_09600090.

[2] PX2325; PX2326; PX2333.

167. Empirical findings (vi)-(vii) show that competitive app distribution, including direct distribution, is the norm for personal computers, including the macOS, which is consistent with the competitive situation seen for smartphones in the absence of restrictions.

vi. For personal computers, I found that direct distribution of apps from developer websites is common. I also found 10 third-party stores that distribute Windows and macOS apps.

vii. I examined how 16 top personal computer applications are distributed to users.[63] They are all distributed directly from the developer website as well as from app distributors such as Staples, Softonics, and CNET.

168. Empirical finding (viii) shows that App Store users would use other distribution channels if given the option based on a comparison of the iOS App Store and Mac App Store.

viii. The Mac App Store functions like the iOS App Store. Both stores use the same Apple user account information and payment methods, subject applications to Apple's review process, and provide similar functionality. Both are pre-installed on their respective devices. The key difference between the Mac App Store and the iOS App Store is that Apple has not made the Mac App Store the only way for developers to distribute macOS apps to consumers. A survey of macOS developers in 2018 found that 78% of macOS developers distributed apps through channels other than the Mac App Store.[64]

2. Competitive Effects Regarding Prices

169. Economic theory and experience show that when barriers to competitive entry are removed, consumers get lower prices. When consumers have more alternatives to choose from, firms have incentives to lower prices to prevent diversion of sales to their rivals. Firms are forced to compete away profits by cutting their prices in the absence of artificial barriers to competition. A detailed empirical analysis of app commissions shows that this theory and experience applies to app distribution. Below I report three main sets of findings.

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[3] PX2116; PX2328.

[4] PX2048; Apple, "Google Stadia," https://apps.apple.com/us/app/google-stadia/id1471900213.

[5] PX2109; PX2280.

[63] The applications were: Adobe Acrobat Reader, Adobe Flash Player, Adobe Photoshop, Avast, uTorrent, WinZip, WhatsApp Web, YTD Video Downloader, Quickbooks, TurboTax, Malwarebytes, Microsoft Office, Skype, Mozilla Firefox, CCleaner, and VLC Media Player.

[64] PX2746.

i. When entry occurs, commissions fall. This evidence supports the economic prediction that entry into iOS app distribution would have resulted in lower prices and that preventing entry artificially raised prices.

ii. Developers pay substantially lower commissions in competitive app distribution markets, in which third-party app stores and direct distribution are not blocked, than those charged by the monopoly App Store.

iii. Entry that caused even a modest dissipation of the App Store's supracompetitive profits would have resulted in substantially lower commission rates.

Lower commission rates directly benefit app developers and indirectly benefit app users to the extent developers lower their prices given their lower costs. Even if developers do not lower their prices, they would retain greater profits to reinvest in their app businesses, indirectly benefiting consumers by increasing quality, output and innovation.

a. Entry and Commissions

170. Personal computer games are distributed through app stores, including ones that specialize in games, and through direct distribution. In this section, I provide two examples of the impact of entry into personal computer game distribution on commissions: the Epic Games Store and the One Store.

171. Steam, owned by Valve, has operated the largest personal computer game store since the mid-2000s. Epic Games launched the Epic Games Store ("EGS"), a personal computer app store, in December 2018. It chose to differentiate itself from Steam in part by giving developers a lower-cost alternative for app distribution and for payments for in-app purchases. Compared with the 30% commission charged by Steam, EGS charges a commission of 12% on the purchase price of its offerings and on in-app purchases for those developers that choose to use its payment processing solution, with 88% of revenues going to developers.

172. The entry of EGS drew an immediate competitive response from Steam, which lowered commission rates for high-revenue-producing games. [redacted][65] [redacted]

173. Valve also noted that "[t]he entrance of a strong competitor to the market absolutely has our attention. For Valve, this has been a strong 're-focusing event'[.] The energy being poured into making Steam a better platform in the following ways is as high as we've seen in a long time[.]"[66] Steam viewed "[t]aking a fresh look at [its] revenue share and re-

[65] VALVE000639 at '647.

[66] DX4200 at '670.

shaping it to reward the games on Steam that provide incredible network effects to the platform" as one way to improve its platform.[67]

174. In South Korea, the three major mobile carriers and the leading search engine formed an alliance to launch an Android app store, in competition with Google Play, called the One Store. It launched in June 2016. After struggling to attract developers, it reduced its standard commission rate in July 2018 from 30% to 20%, where it remains today.[68] It also allowed developers to use their own payment methods, in which case it charged a 5% commission. One Store now accounts for 20.6% of Android app store sales in South Korea which means the average effective Android commission in South Korea (including Google Play) has declined by at least 6.9% ((20.6%*10%)/30%). In addition, the One Store has offered promotions to users, with refunds of 30-50% on total transactions for certain gaming apps.

b. Commissions in the Absence of Distribution Restrictions

175. Commissions in the absence of distribution restrictions would have been lower than the commissions Apple currently charges on iOS.

176. *First*, I have estimated that the effective commission for the distribution of game apps for personal computers, where Microsoft and Apple do not block third-party app stores or direct distribution, is no higher than 14.5%. iOS game apps pay a 30% commission to the App Store, which is more than twice as high. I examined game apps because I had data from Microsoft on direct distribution for this category of apps.

177. I arrived at my 14.5% estimate as follows. [redacted][69] To be conservative, I assumed that the effective cost of direct distribution is 12% based on EGS's commission. I also assumed that the average commission for third-party app stores is equal to the [redacted] which is conservative because EGS and other third-party app stores charge lower commissions. Based on these assumptions, I calculated that the average cost incurred by developers, based on their actual or effective commissions on in-app purchases, is 14.5%, and likely lower given the conservative assumptions.

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[67] DX4200 at '671.

[68] Korea Bizwire, "Korean App Market ONE Store Eyes Global Alliance to Compete with Google," December 1, 2019, http://koreabizwire.com/korean-app-market-one-store-eyes-global-alliance-to-compete-with-google/148739; Korea JoongAng Daily, "One Store gains ground in local Android app market," December 2, 2020, https://koreajoongangdaily.joins.com/2020/12/02/business/industry/One-Store-app-market-Google/20201202175300439.html.

[69] PX2477.17.

178. *Second*, the average effective commission for Android app distribution in China is substantially lower than the App Store commission. That may seem surprising given that many app stores in China have a listed commission rate of 50% for game apps. However, some developers pay much lower effective rates because they can negotiate lower rates, operate their own app stores, use app stores that charge lower rates, and use direct distribution. Given lower-cost alternatives, they can decide whether the services provided by Android app stores are worth 50% or whatever rate they can negotiate.

179. Consider Tencent, which accounts for more than half of mobile game revenue in China. It has negotiated commission rates of 30% with many app stores, and analysts estimate that the average rate paid is 40%.[70] But it uses those app stores for only 30% of its Android sales.[71] For the bulk of its sales, it relies on its own app store and direct distribution from its websites. Assuming conservatively that its cost of direct distribution is 12%, its average commission rate is 20.4%. By contrast, it pays the App Store a 30% commission.

c. Dissipation of App Store Profits Under Competition

180. Based on the empirical evidence discussed above, I would expect that in the absence of Apple's restrictions, multiple app stores would enter on iOS, some of which would provide general app distribution while others of which would provide specialized app distribution. I would also expect that developers would use direct distribution. In this situation, developers could decide whether to use app stores with particular commission levels or other alternatives, as has been the case in China for Android apps and for Windows and macOS apps. Based on the evidence, I would expect that this competition would put downward pressure on Apple's commissions and result in substantially lower effective commissions for developers.

181. Apple would have to respond to entry through some combination of lowering its commission rate and/or increasing the amount and quality of services provided to developers to mitigate the decline in traffic to the App Store and the revenues earned by the store. These reactions would dissipate some of its profits, which is expected when competition is present. Using the App Store financials, I have prepared two calculations that show that, even with reductions in the App Store's profit margin that would leave it well above the benchmark online marketplaces, it would have substantially lower commission rates.

182. *First*, I calculate what the App Store's commission rate and profit margin would be if Apple capped its profits at $1 billion per year. In July 2011, Mr. Schiller, who was the Senior Vice President, Worldwide Product Marketing at the time, noted in an email to Mr. Jobs and Apple Senior Vice President, Internet Software and Services, Mr. Eddy Cue that in order to

[70] Guan Cong, Zhang Erchi and Qu Yunxu, "Tencent Game vs. Huawei", Caixin Weekly, Issue 2, January 11, 2021, https://m.weekly.caixin.com/m/2021-01-09/101648507.html; J.P. Morgan "Thoughts on Tencent's partnership with NVIDIA to launch cloud gaming service," December 20, 2019, p. 2.

[71] J.P. Morgan "Thoughts on Tencent's partnership with NVIDIA to launch cloud gaming service," December 20, 2019, p. 2.

"stay competitive" the commission rate might need to be ratcheted down to 25% or 20%.[72] Mr. Schiller also noted that Apple might adjust its commissions so as to cap its profits at $1 billion a year. That would have been much more consistent with Mr. Jobs' promise to the industry that Apple's distribution fees would "pay for running the App Store."[73] [redacted]

183. *Second*, I calculate the commission rate that would result if Apple's profit margin were competed down to the highest level identified by Mr. Barnes for the five online marketplaces—Alibaba's 45.8% margin—by two rivals that achieved the same margin and charged the same commission rate. That profit margin is double the median for the five benchmark online marketplaces. I have assumed conservatively that each rival would have the same fixed costs of operating an App Store as implied by the App Store financials, even though it is likely that smaller stores would operate at substantially lower fixed costs and act as an even stronger constraint on the App Store's commission rate. I used the demand elasticity of -2.19 estimated from Dr. Rossi's survey. If developers passed through 50% of commission costs to users, I find that the App Store and the two rival app stores would charge a commission of 15.6% while still being highly profitable.[75]

184. I have also used this conservative entry scenario to examine the impact on the prices that users pay for apps and their in-app purchases. If developers passed on 50% of the commission cost savings, the price they charge for in-app purchases would decline by 6.5% and purchases would increase by 16.0%.

d. Summary of Commission Rate Evidence

185. The three categories of empirical evidence reported above show that the average commission rate paid by developers, some of which is likely passed on to users, would be substantially lower in the absence of Apple's app distribution restrictions. Those restrictions have caused, and continue to cause, higher commission rates than would occur if Apple had not blocked all channels of iOS app distribution other than the App Store.

[72] PX417.

[73] PX880.21.

[74] See Table 3.

[75] The commission rate would be similar with higher and lower pass-through rates.

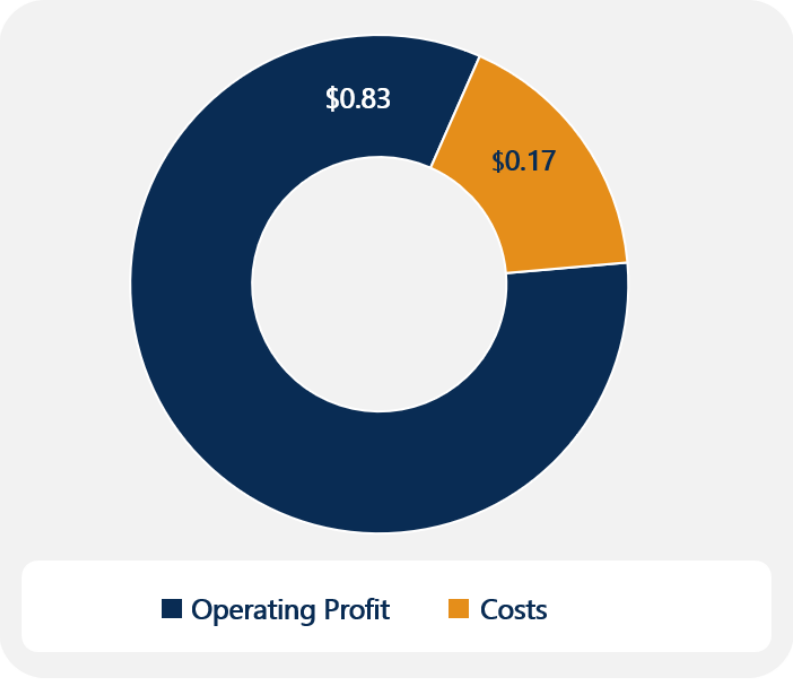
3. Competitive Effects Regarding Distribution Services, Quality, and Innovation

186. When consumers have choices, firms have to compete not just on price, but also by offering better and more innovative products.[76] I have found that, but for Apple's app distribution restrictions, iOS app developers and users would have more, and better, services from the App Store, and would have benefited from more innovation, including innovative entry.

a. Spending on App Store Services and Innovation

187. One reason the App Store has had a high profit margin is that it has not spent much on providing services to iOS app developers and users. As shown in Figure 3, of every dollar it takes in revenue from developers, Apple spends 17 cents including for fixed costs. One reason the benchmark online marketplaces have had lower margins is because they have spent more running their stores.

Figure 3: Where Each Dollar of iOS App Store Revenue Goes



188. The App Store has also spent comparatively little on R&D. Although Apple does not directly report R&D expenditures for the App Store, it does report R&D expenditures for the iTunes Store, and the revenue of the iTunes Store has come mainly from the App Store

[76] Firms can compete by offering lower quality products at lower prices. A firm will lose sales, however, to rivals that offer better products at the same price, or that offer the same quality product at a lower price. Firms that don't innovate will ultimately lose sales to firms that do.

in recent years. Table 7 reports the ratio of R&D to sales for the iTunes Store for the fiscal years 2015 to 2019. It shows comparable information for the five benchmark online marketplaces.

Table 7: R&D as a Percentage of Total Revenue: Apple iTunes and Other Online Marketplaces[77]

	Fiscal Year Ended				
Marketplace	2015	2016	2017	2018	2019
iTunes	3.73%	4.52%	4.07%	3.05%	3.31%
eBay	10.7%	12.0%	12.3%	12.0%	11.5%
Etsy	15.6%	15.1%	16.9%	16.1%	14.9%
Alibaba	13.6%	10.8%	9.1%	9.9%	8.5%
MercadoLibre	11.7%	11.7%	10.5%	10.2%	9.7%
Rakuten	1.2%	1.3%	NR	NR	NR
Median of other Online Marketplaces	11.7%	11.7%	11.4%	11.1%	10.6%
Ratio of the Median of Other Marketplaces to iTunes	3.1	2.6	2.8	3.6	3.2

Notes: NR denotes not reported. Data reported for Alibaba are for the fiscal year ended March 31 of the year following each representative calendar year.

189. In 2019, the R&D to sales ratio of the iTunes Store (including the App Store) was 3.3%, while the R&D to sales ratio for the median online marketplace was 10.6%. R&D spending for the App Store was therefore only a third of the median for the online marketplaces in 2019.

190. Competition foreclosed by Apple's app distribution restrictions would have forced the App Store to dissipate its profits by spending more on providing valuable services to iOS app users and developers and by investing in innovation. There would have been an opportunity to do that based on the qualitative evidence summarized below.

[77] PX1077 (summarizing PX2575-PX2579; eBay SEC Form 10-K for the fiscal years 2013-2014; PX2581-PX2585; PX2874-PX2878; Alibaba SEC Form 20-F for the fiscal year 2014; PX2587-PX2591; MercadoLibre SEC Form 10-K for the fiscal years 2013-2014; PX2592-PX2597; Rakuten Annual Reports for the fiscal years 2012-2013; PX607).

b. Search and Discovery

191. An example of the lower quality services that the lack of competition for iOS app distribution has yielded is poor search and discovery in the App Store. Apple conducted surveys of developers concerning their satisfaction with the App Store along with other Apple services. A February 2010 survey of iPhone developers administered by Apple found that "[a]pp visibility in the App Store is the area of most dissatisfaction" and "[v]ery few developers are 'somewhat' or 'very satisfied' with the visibility of their apps in the App Store".[78] Only 30% of U.S. respondents said that they were satisfied with the "visibility of your app on the App Store." In the same survey, 90% of U.S. developers were satisfied with the iOS SDK that they used to develop apps.[79] That 30% satisfaction rating was less than half of the 74.4% national average customer satisfaction score across all sectors and industries.[80]

192. The situation did not improve much in later years. A May 2017 Apple survey of iOS app developers found that only 36% of U.S. developers expressed satisfaction with whether the App Store "[e]nables discovery of my apps".[81] When the survey participants were asked for the top three most effective marketing activities for driving downloads on the App Store, the three most frequent answers from U.S. developers were unrelated to the App Store (word-of-mouth marketing, social media community outreach, and social media advertising).[82]

193. Apple executives have recognized the problem. Mr. Schiller forwarded an article about the discoverability and other problems with the App Store, noting that it contained "[s]ome constructive criticism with suggestions..."[83] The article, titled "Where's the App for That?", stated:

> With so many apps in the App Store, discovery has become such a serious problem that today's version of Apple's 2009 catchphrase may as well be 'Where's the app for that?'

194. The Apple survey evidence is consistent with statements I have reviewed from a survey of trade press, analysts, and other industry observers between 2009 and 2020. I will elaborate on these findings at trial.

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[78] DX3877 at '423, '428.

[79] DX3877 at '425.

[80] Sara Staffaroni, "Customer Satisfaction Score (CSAT) Industry Benchmarks," GetFeedback, November 24, 2019, https://www.getfeedback.com/resources/cx/customer-satisfaction-score-csat-industry-benchmarks/.

[81] DX3922 at '104.

[82] DX-3922 at 087.

[83] PX2065.

195. Competition would have forced the App Store to improve its search and discovery capabilities, which would have resulted in more efficient matches for iOS app users and developers. It would also have given iOS app users and developers other search and discovery alternatives.

c. Marketing and Promotion

196. Online marketplaces typically promote sellers and their products as part of the services provided to buyers and sellers. The App Store uses some of the standard techniques of online marketplaces to highlight apps. A May 2017 survey of Apple app developers found that only 34% of U.S. developers felt that the App Store "[p]rovides the tools I need to successfully market apps".[84] The level of satisfaction on this point was even lower in two prior surveys, at 21% in March 2015[85] and 26% in December 2015.[86]

197. Many developers reported in the May 2017 survey they were not satisfied because the App Store did not offer personalized recommendations.[87] That's a common feature in other online marketplaces. For example, Amazon has offered personalized recommendations to customers since at least 1997 and published a paper in 2003 describing their methodology.[88] Apple did not make App Store discovery and personalization a focus area until its 2018 fiscal year. Apple noted that as of 2017, the App Store was "one-size-fits-all".[89]

198. Better marketing and promotion would have benefited users who would have received more information about apps, which would have improved their decisions on which apps to use.

d. IAP and Other Requirements

199. To be carried in the App Store, Apple has various requirements that impose costs on iOS app developers and users, including the following from Apple's Developer Program License Agreement (DPLA) and App Store Review Guidelines:

[84] DX3922 at '099.

[85] APL-APPSTORE_09986588 at '660.

[86] APL-APPSTORE_09797056 at '060.

[87] DX3922 at '096.

[88] Amazon.com SEC Form 10-K for the year ended December 31, 1997, at p. 2; Linden, Greg, Brent Smith and Jeremy York (2003) "Amazon.com Recommendations: Item-to-Item Collaborative Filtering," *IEEE Internet Computing* 7(1), pp. 76-80.

[89] PX2176.28.

- iOS apps are exclusively distributed through the App Store[90] and must be approved by Apple.[91]

- iOS apps must "not create a store or storefront for other code or applications" and will "not provide, unlock or enable additional features or functionality through distribution mechanisms other than the App Store, Custom App Distribution or TestFlight".[92]

- Developers must use Apple's payment solution for sales of in-app digital content.[93]

- Developers must pay Apple a 30% commission on digital content sales, including in-app purchases.[94]

- Developers must make content available for in-app purchases if they make that content available on other non-iOS platforms.[95]

- Developers must offer Sign-in-with-Apple if the app uses any third-party login service such as Google or Facebook.[96]

- Developers must make changes to their apps as demanded by Apple as a condition of getting access to iOS users.[97]

200. Several restrictions are related to Apple's IAP requirement, which is discussed in more detail below. Apple requires that developers use IAP, and the Apple payment solution, through which Apple collects revenue from developers on in-app purchases of digital content. It then imposes various restrictions that steer transactions to IAP by preventing developers from

[90] PX2557.38; PX2557.65.

[91] PX2557.16.

[92] PX2557.17.

[93] PX2558 at 3.1.1.

[94] PX2621.4-PX2621.5. Apple charges a 15% commission "for auto-renewing subscription purchases made by customers who have accrued greater than one year of paid subscription service within a Subscription Group." *Id*. On January 1, 2021 Apple began charging a 15% commission for developers who made less than $1 million in the previous calendar year on iOS. See Apple, "Apple announces App Store Small Business Program," November 18, 2020, https://www.apple.com/newsroom/2020/11/apple-announces-app-store-small-business-program/.

[95] PX2558 at 3.1.3(b). Apps may allow a user to access previously purchased content for magazines, newspapers, books, audio, music, and video. PX2558 at 3.1.3(a).

[96] PX2558 at 4.8.

[97] PX2557.35-PX2557.36.

offering in-app purchases on non-iOS platforms without offering them in their iOS apps, or from communicating with customers about options for making purchases outside the app.

201. In the absence of Apple's app distribution restrictions, competition would enable developers to use other app stores that do not require developers to use the store's payment solution or that could provide lower prices or a better solution for the developer's requirements. Developers could also use direct distribution. This competition would put pressure on App Store commission rates and encourage Apple to improve its IAP payment solution, such as by providing more customized solutions or relaxing its associated requirements.

e. iOS App Store and Mac App Store Comparison

202. The Mac App Store has many of the same features and requirements for developers as the iOS App Store. Apple, however, does not require that developers use the Mac App Store as a condition of distributing macOS apps. The difference between these two Apple stores provides meaningful information for what developers would do in the absence of the app distribution restrictions. In 2018, 78% of macOS developers used channels of distribution other than the Mac App Store.[98]

203. Apple asked Adobe why it did not use the Mac App Store more. Adobe responded with a long list of a wide range of problems.[99] Apple conducted a review of 18 macOS developers (including Adobe) that had either declined to use, were unhappy with, or had left the Mac App Store; 15 of those developers listed problems similar to those raised by Adobe (not counting issues with sandboxing requirements in the Mac App Store, which are not applicable to iOS apps).[100]

204. Developer behavior with respect to the Mac App Store provides strong evidence that Apple's app distribution restrictions have caused iOS app developers to use an inferior distribution channel and that its restrictions have thereby reduced quality in the iOS app distribution market. These same restrictions have caused iOS app users to use an inferior distribution channel.

f. Innovative Entry

205. Apple's app distribution restrictions prevent innovation in the iOS app distribution market by blocking app stores that have new and creative ways of serving iOS app users and developers. Recently, it prevented the entry of specialized apps for distributing games by Amazon, Facebook, Google, Microsoft and Nvidia that had innovative models. We cannot know whether game developers and users would have found those models desirable.

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[98] PX2746.

[99] PX133.

[100] DX4024 at '742.

206. Distribution for personal computer OSs demonstrates the value of allowing entry. In 2003, Valve, a leading game developer at the time, started Steam, a store to distribute its own games, to solve specific problems presented by existing distribution alternatives for personal computer games. According to a Valve executive,

> "We went around to everybody and said 'Are you guys doing anything like this? We need this for our games, and therefore other people are going to need it someday soon.' And everyone was like: 'Blah, blah, blah...That's a million miles in the future.' So we said 'We need it now' and everyone said 'Well, we can't help you.'"[101]

207. Valve opened Steam to other game developers in 2005 and become the leading online store for personal computer games. In addition to operating an online marketplace for games, Steam has introduced many other features that have benefited game developers and players. These include social network capabilities such as text and voice chat and discussion boards; a separate marketplace for buying and selling in-game items; and personalized game recommendations.

208. This innovative entry could not have happened if Microsoft had prevented Windows app developers from distributing their apps directly to users or from using third-party app stores. Unknown and unknowable is what innovation Apple's restrictions have prevented and continue to prevent.

4. Apple's Ability and Incentives to Limit Competition with Its First-Party Apps

209. Apple has used its monopoly over the App Store to engage in practices that limit competition between third-party apps and its own apps. It would have less ability to do so with competition in iOS app distribution because developers could use other channels, not subject to App Store practices, and Apple would have less incentive to engage in this conduct, because it would lose revenue and traffic to the App Store if developers were to use other channels.

a. Self-Preferencing with Respect to Search and Discovery and Promotion

210. Apple can use the search and discovery features of the App Store to advantage its own apps and disadvantage those of rivals—a practice known as "self-preferencing"—including declining to promote competing apps. There is evidence from the discovery record, described below, that Apple has used self-preferencing to disadvantage rival apps in the App Store.

211. In January 2012, in response to an inquiry from the App Store team asking if they should promote a new music player app by Shazam, Mr. Cue replied: "No promotion... we are not going to promote something that puts it's [sic] goal as replacing our music player unless

[101] GamesIndustry.biz, "The Last of the Independents?" https://www.gamesindustry.biz/articles/the-last-of-the-independents-.

it is significantly better than our player and this is not."[102] Apple subsequently acquired Shazam in 2018.

212. In May 2019, in response to complaints by LinkedIn that it was not permitted to engage in marketing that was similar to that seen for Apple's own apps, an App Store businessperson wrote "Developers (latest LinkedIn) cannot fathom why our apps are permitted to do things they are not…"[103]

213. In an internal Apple email in May 2018, an App Store businessperson noted that "I think the [Apple] Files app was manually boosted on the top for the query 'Dropbox' during last WWDC [in June 2017]."[104] That is, Apple chose to manually insert its own Files app above the app of a competitor, Dropbox, for nearly a year. Apple Vice President, App Store, Mr. Matt Fischer noted that he wanted to know how it had happened and to be consulted for any similar requests in the future, though he did not state that Apple should not preference its own apps in the App Store.

b. Competitive Effects of Apple's Ability and Incentive to Disadvantage Third-Party Apps

214. Apple has faced no constraints in engaging in the behavior described above because developers and users have nowhere else to turn but the App Store for iOS apps. When Apple uses the App Store review process to hinder a rival app, downgrades a competing app in search results, it affects all of the developer's business with iPhone users.

215. Developers would face lower risks and costs if more of their business came from other distribution channels. Meanwhile, Apple would have less incentive to use the App Store for these purposes because it would risk losing developers, and then users, that would divert their distribution demand to other channels.

5. Summary of Competitive Effects in iOS App Distribution Market

216. For some two-sided platform markets, the challenged conduct can harm one group, but benefit the other group, so that the overall market effect is based on the net of these two opposite effects. In other two-sided platform markets, the challenged conduct has adverse effects on both groups.

217. Based on my analysis in this matter, I conclude that Apple's challenged conduct harms both developers and users. The app distribution restrictions result in both groups paying higher prices, getting less and poorer quality distribution services, and less innovation, including innovative entry.

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[102] PX428.

[103] PX858.2.

[104] PX2031.1.

218. I have therefore concluded that Apple's app distribution restrictions have harmed competition and consumers in the two-sided iOS app distribution market, and these practices have raised the overall price, reduced overall quality, and reduced innovation—as compared to the but-for world in which Apple's app distribution restrictions did not exist.

219. I have also concluded that, under an alternative approach, based on linked single-sided markets, that these restrictions have harmed competition and consumers in the separate iOS app distribution markets for iOS app users and developers. In either case, the practices have resulted in consumers in those markets paying higher prices and getting lower quality and less innovation than in the but-for world. I would also reach the same conclusion for app distribution markets that include both iOS and Android distribution since Android app distribution provides no material competitive constraint on iOS app distribution for the reasons discussed earlier.

VII. THERE IS A RELEVANT ANTITRUST MARKET FOR IOS IN-APP PAYMENT SOLUTIONS, IN WHICH APPLE HAS MONOPOLY POWER AND IN WHICH APPLE'S CONDUCT HAS CAUSED ANTICOMPETITIVE EFFECTS

220. I have analyzed Apple's IAP requirements under the assumption that Apple has a lawful monopoly in the iOS app distribution market, and I conclude that:

i. Payment solutions for in-app purchases (including IAP) and app distribution are separate products;

ii. Apple has required that a targeted group of app developers use Apple's payment solution as a condition of distributing apps to iOS users via the App Store;

iii. The provision of payment solutions to this targeted group of app developers constitutes a relevant antitrust market, based on standard economic approaches involving price-discrimination markets, in which Apple has monopoly power;

iv. Apple's requirement that developers of these apps use its payment solution has caused anticompetitive effects by increasing the price of payment solutions, reducing the quality of these solutions for developers and their customers, and slowing innovation compared to a competitive market in which Apple did not mandate the use of IAP;

v. Apple's requirement that developers use its payment solution meets the economic conditions of a tie; and

vi. The fact that some other app stores also bundle app distribution and payment solutions does not alter these conclusions because these stores likely lack substantial market power and developers can therefore choose whether to take the bundle of services or not.

221. Apple's IAP requirement would have lesser anticompetitive effects if developers did not have to use the App Store as their sole distribution channel for iOS apps. Apple's IAP requirement would not have anticompetitive effects, or meet the economic conditions of a tie, if the App Store did not have substantial market power in iOS app distribution.

A. Background

222. I provide in this section a brief overview of payment solutions and payment processing and Apple's IAP requirement and its payment processing infrastructure. I base my opinions here and throughout Section VII both on my research and analysis conducted for this matter and on my professional knowledge of the payments industry, which has been the subject of my scholarly research and writings.

1. Payment Solutions and Payment Processing

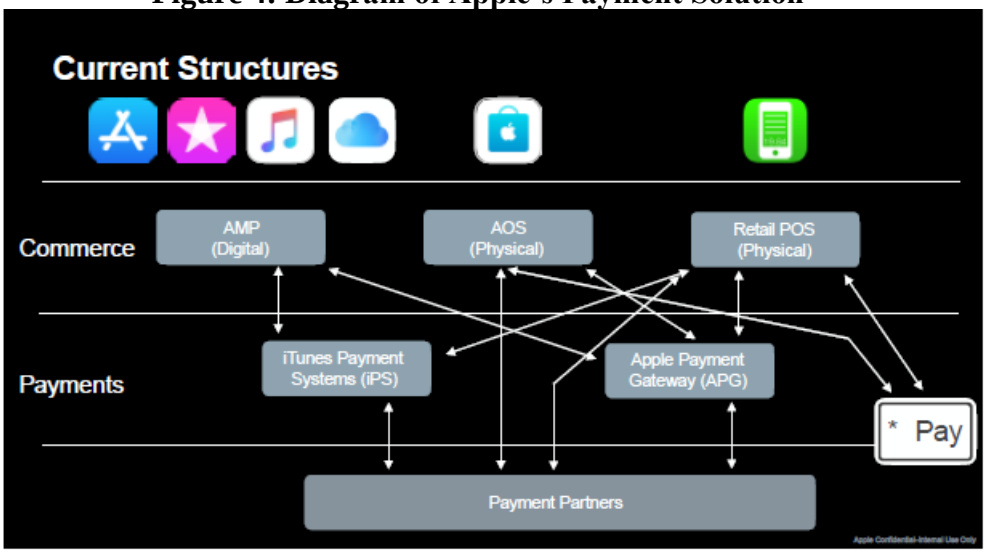
223. As a general matter, a payment solution enables a merchant to accept payment credentials, such as credit cards, from customers and collect payment from the funding source behind those credentials, such as the bank that issued the card. Payment solutions involve using a payment processor, which can authenticate payment credentials, enable the collection of funds from the funding source, and pay the merchant what it is owed from the customer less applicable fees. In the last decade, many payment processors have emerged that specialize in online transactions, including those involving mobile apps, and have spurred innovation.

224. Developers often create portions of their own payment solutions, including the user interface for their customers, in conjunction with online payment processors that provide an API that developers can incorporate in their software. Developers typically rely on multiple payment processors that can provide more payment options to their customers, who may be located in many countries, and valuable features for their payment solutions.

2. Apple's Payment Solution Based on Apple ID

225. Apple has developed a payment solution, which it uses for its various online businesses as shown in Figure 4, which reproduces a page from an Apple Payments & Commerce deck from March 2018. AMP refers to Apple Media Properties which include the App Store, the iTunes Store on iOS, Apple Music, and iCloud. The iTunes Payment Systems handles PayPal and non-US payment types, and the Apple Payment Gateway handles the major credit and debit card brands, for all of these properties. Apple requires customers to establish an Apple ID, to which they can attach payment credentials. Apple's payment solution also uses online processors. The Apple payment solution was originally developed for its iTunes Store in 2003.

Figure 4: Diagram of Apple's Payment Solution[105]



3. Apple's IAP Requirement

226. Apple's DPLA and App Store Review Guidelines require that iOS developers use Apple's IAP mechanism for any in-app sales made to users that unlock features or functionality within the app.[106] The developer has to use a set of APIs provided by the App Store to support this check-out method. When a consumer purchases an in-app item by, for example, pressing a "buy" button, the payment is processed using Apple's payment solution. Apple remits the developer for payments made by users, minus Apple's commission, monthly.

227. Apple has required that apps offering in-app purchases of digital content and services use IAP, but not apps offering in-app purchases of physical goods and services ("physical apps"). Apple has allowed certain exceptions to its IAP requirement, discussed further below.

4. IAP Services Provided to Developers

228. Apple's IAP programming guide for developers warns that "In-App Purchase only collects payment. You must provide any additional functionality, including unlocking built-in features or downloading content from your own servers."[107] It explains that:

> "The Store Kit API is only a small part of the process of adding a store to your application. You need to decide how to track the products you plan to deliver, how your

[105] PX523.12.

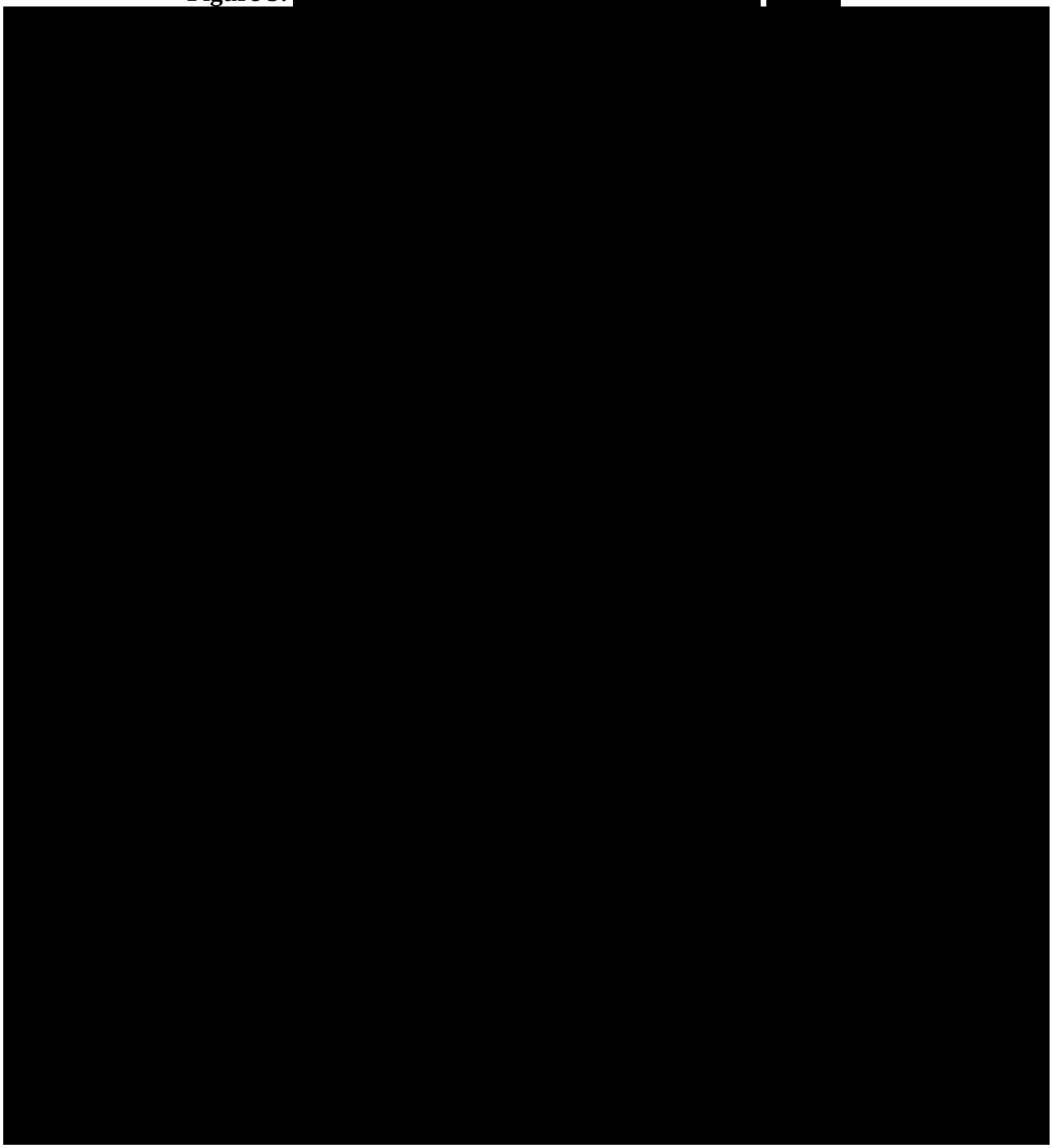
[106] PX2557 at 3.3.3; PX2558 at 3.1.1, 3.1.3.

[107] DX-4649 at '673.

application presents a store front to the user, and how your application delivers the products users purchase from your store."

229. Figure 5 reproduces a figure from Apple's programming guide that shows which functions are provided by IAP and which by the iOS app itself, for apps that conduct some activities on servers operated by the developer. The only thing IAP does is return product information when requested, and then process the payment and return a completed transaction. Everything else is done by the app developer.

Figure 5: [redacted]



B. Payment Solutions for In-App Purchases and App Distribution Are Separate Products

230. It is often efficient for businesses to provide bundles of products. This may be the case because that is what their customers want; because it is costly to sell the bundled products separately; or because products must be integrated for technical reasons. Antitrust

economics distinguishes these cases by examining whether there is separate demand for the two products. If there is separate demand that suppliers meet, then some consumers would prefer to purchase those products separately, and it is efficient for suppliers to serve that demand. Where there is separate demand, the bundled products are properly considered two separate products rather than a single, integrated product.

231. Assessing whether there is separate demand for payment solutions and app distribution is the first step in analyzing the competitive effects of Apple's IAP requirement.

1. App Distribution, In-App Purchases, and Payment Solutions

232. Apps are different from many products that consumers buy at a store because they often support an ongoing businesses relationship between the developer and the app user, including the sale of products and services to customers within the app. Adobe Acrobat, for example, distributes its app directly to customers on their personal computers. Once a customer has the app, they set up an account and attach a payment card. Adobe charges for the subscription and any renewals. Uber, to take another example, distributes its app to customers through the App Store. Once the customer has the app, they set up an account and attach a payment card. Uber charges that card for subsequent rides.

233. The in-app transaction between a business and customer using an iOS app does not have to involve Apple and often does not—except that Apple has required that the business use IAP for certain transactions as a condition of Apple distributing the iOS app through the App Store. The fact that Apple compels the use of IAP, however, does not provide any relevant economic evidence on whether IAP and app distribution are separate products. Any company that ties two products together—say automobile service and parts—can make a similar assertion. But it is necessary to examine whether there is separate demand for payment solutions and app distribution to determine whether they are separate or in fact a single product.

234. The empirical evidence reported next shows that payment solutions are separate products from app distribution. When given the choice, developers usually create their own payment solutions or use a turnkey solution.[109] They often do not get their payment solutions as part of a bundle from an app store. When given the choice, they get distribution services from app stores, or other channels available to them, without also getting a payment solution from those same stores.

[108] PX526.12-PX526.13.

[109] PayPal is an example of a simple turnkey solution. A developer could just have a PayPal payment button, which would then handle almost all aspects of a payment solution.

2. Digital Apps Choose Their Own Payment Solution When Given a Choice

235. I have identified situations in which the App Store or Google Play Store gave app developers the choice of using the store-supplied solution (IAP or Google Play Billing) or their own payment solutions. In all cases, developers chose their own solution:

i. Apple allowed customers of three large developers—Amazon Prime Video, Altice One and Canal+—"the option to buy or rent movies and TV shows using the payment method tied to their existing video subscriptions." I have confirmed that in all cases, these developers chose to use their own payment solutions.

ii. Google allows developers of non-gaming apps that enable users to buy digital goods that can also be consumed outside of the app to use their own payment solutions for those apps. I have confirmed that Hulu, Netflix, Tinder, and Spotify use their own payment solutions in their respective Android apps.

iii. Apple gave Uber and Lyft the option of using IAP for the purchase of ride subscriptions. Both chose to use their own payment solutions instead.

236. In all of these cases, the developers had existing payment solutions for apps that were distributed for personal computers, connected televisions or, in the case of Uber and Lyft, mobile non-subscription transactions. Developers created those payment solutions separately from app distribution and, when permitted, can use those payment solutions for apps distributed through the Apple and Google stores, which is what they did. In the case of Apple, all of these developers distribute their apps through the App Store even though they are not using IAP. Developers therefore have separate demand for payment services and for app distribution.

237. This is not to say that developers would never choose to use payment services offered by an app distributor, including as part of bundle. Had Apple offered IAP on better terms, some of these developers perhaps would have opted to use it.

3. Physical Apps That Cannot Use IAP

238. Apple does not make IAP available to most physical apps. Like the digital apps above, physical apps supply their own payment solutions, which they create in concert with payment processors. As consumers, we know that when we use these apps, we must set up an account with the app and provide a payment credential. I have confirmed that 11 popular physical apps—Grubhub, Wish, StubHub, Uber, DoorDash, Lyft, Instacart, PostMates, Amazon Shopping, Walmart, and eBay—have their own payment solutions from inspecting the apps and verifying their payment processors.

239. Physical apps therefore have separate demand for payment solutions and they can meet that demand by creating their own solutions in concert with payment processors. The

fact that Apple does not offer IAP to these physical apps does not change the finding that, as a matter of economics, there is separate demand for payment solutions and app distribution.

240. Conversely, if Apple mandated that physical apps use IAP, or some variant tailored to physical apps, it would not turn their separate demand for payment solutions into a single demand for app distribution and payment solutions. Uber and Lyft, for example, would still have separate demand for payment solutions even if Apple required that they use IAP for ride subscriptions. As a matter of economics, just because a company says a buyer has to take a bundle does not mean that the bundle is a single product.

4. Developers Subject to the IAP Requirement That Have Sought to Use Their Own Payment Solutions

241. In addition to Epic, Apple has acknowledged that it has terminated more than 2,000 developer accounts for violating its IAP requirement. Match Group, Facebook, Spotify, Microsoft, and Hey have sought to use their own payment solutions. These developers had separate demand for payment solutions. The Match Group also changed its in-app payment processing method inside its Tinder app for Android, so that users had the option to pay using Tinder's payment solution or Google Play's payment solution, with the same price for each option. [redacted] This demonstrates both developers' and consumers' demand for a payment solution separate from app distribution.[110]

242. In 2012, Microsoft sought to have users of its iOS Office app sign up for subscriptions by being taken out to Microsoft's "sign-up for Office" website rather than use IAP. Microsoft was willing to pay Apple their 30% commission, but did not want to use IAP. While Apple did not permit this, it is an example of a developer wanting to use a payment solution other than IAP even if Apple's solution were effectively available for free.

5. App Store, Distribution, and IAP

243. Apple provides app distribution separately from IAP. Apple distributed apps through the App Store before IAP was created. Apple also distributes physical apps, ad-supported apps, and apps that do not offer in-app transactions. Other app stores do the same. There is separate demand for app distribution, which app stores provide.

244. Apple's payment solution is a separate service that is provided to multiple Apple properties, predated the App Store, and has not been operated as part of the App Store. It is not provided for most apps that are distributed through the App Store, as noted above. It is therefore not part of an integrated product.

245. Apple also does not have to require that developers use IAP to operate a profitable app store. It could charge separately for distribution services. It could also offer IAP as a separate product. Smaller developers could find IAP attractive at the current commission

[110] PX863.

of 30% (or now 15%, if the developer makes under $1 million per year on iOS), because it would allow them to avoid the fixed costs associated with managing a payment solution. And larger developers could potentially find that IAP would be attractive to use, exclusively or alongside other alternatives, if it were offered at a lower commission. Given Apple's profit margin, it has great latitude in operating a profitable app store—and a profitable payment solution—on a competitive basis, without requiring IAP.

246. Several Android app stores do not require that digital content providers use the store's check-out method, and its payment processor, for in-app purchases, and developers use these app stores and their own check-out methods with their choice of payment processor. This includes Google Play Store with respect to non-gaming digital content that may be consumed outside of the app, as well as app stores in South Korea and India. In addition, the Epic Games Store on PC does not require that developers use the Epic payment solution, and some large developers have chosen to use their own payment solution.

C. Relevant Antitrust Market

247. I turn now to analyze the relevant market for evaluating Apple's IAP requirement, and I begin by discussing the market definition principles that are applicable to the inquiry. I conclude that the relevant market is the market for payment solutions for accepting and processing payments for purchases of digital content made within an iOS app.

248. This market is centered around a targeted group of customers, *i.e.*, those that sell digital content in their apps. Such a market is appropriate when a firm can apply its conduct to the targeted group without facing competitive discipline, for example, from the targeted customers' being able to substitute or to negotiate for better terms. In these circumstances, the targeted customers are vulnerable to an increase in price. Developers that offer in-app purchases subject to Apple's IAP requirements are such a targeted group. Within this group, Apple applies the same IAP restrictions, and the same pricing, regardless of the type of app.[111]

1. Applicable Market Definition Principles

249. To help exposit the analysis of market definition, it is useful to begin by considering a hypothetical situation in which there is a competitive market for payment solutions for iOS in-app purchases of digital content and then describe how antitrust economics would determine the relevant market for assessing a requirement that developers begin using an app store's payment solution.

250. Currently, developers of physical apps obtain payment solutions in a competitive market, in which they build their own user-facing solution and rely on a third party

[111] Apple permits so-called "Reader" apps to allow a user to access previously purchased content or content subscription (specifically: magazines, newspapers, books, audio, music, and video). PX2558 at 3.1.3(a).

for back-end payment processing, or rely on a turn-key solution. The cost of processing transactions using payment processors is around 5%.

251. Suppose an app store adopted a policy that required physical apps to begin using its in-app payment solution, perhaps one customized to physical apps, as a condition of being distributed by the store, and further suppose that it charges a higher price than what those developers were otherwise paying. If a developer complied, it would no longer be able to use its self-supplied payment solutions or the payment processors it hired to support those solutions. If a developer did not comply, the app store would not carry its app or allow users to update the app.

252. To analyze whether the app store has the market power to force physical apps to use its payment solution, and at a higher price, an antitrust economist would need to assess the relevant market. That would involve an analysis of whether developers could switch to other channels of distribution, which would be the developers' only option because switching payment processors would not be permitted in the current store and exiting the platform would be unprofitable. Suppose, however, that we had historical evidence that, following the imposition of this policy, the targeted developers used the app store's payment solution for which they paid a substantially higher fee than they paid for the payment solution they previously self-supplied in concert with payment processors. That those developers did not switch implies that they had no reasonable alternative to switch to—no alternative payment solution and no alternative distribution channel.

253. Those empirical before-and-after observations would provide strong evidence that the targeted developers are what antitrust economists sometimes refer to as a price discrimination market. As Professor Jonathan Baker has explained, a price discrimination market can be found when

> "…a hypothetical monopolist of a group of products and locations would raise price profitably to a class of targeted buyers, without raising price to all buyers… A price discrimination market is defined not just by its products and locations; the definition also must identify the targeted buyers."[112]

The targeted customers are foreclosed and isolated from whatever competitive threats the hypothetical monopolist would face for non-targeted customers. They are like a group of customers that are isolated in a hard-to-reach geographic area. The U.S. DOJ/FTC merger guidelines also recognize the economic concept of a price discrimination market.[113]

254. To assess market definition in this hypothetical, an antitrust economist can posit that the app store is a hypothetical monopolist over the provision of payment solutions to the

[112] Baker, Jonathan (2007) "Market Definition: An Analytical Overview," *Antitrust Law Journal*, 74(1), pp. 129-173, at p. 151.

[113] U.S. Department of Justice and the Federal Trade Commission, "Horizontal Merger Guidelines," August 19, 2010, at § 4.1.4, https://www.justice.gov/atr/horizontal-merger-guidelines-08192010#4e.

targeted apps selling physical goods that want to use its store for distribution. Empirical evidence that the app store forced the targeted developers to take its payment solution and pay a substantially higher price would demonstrate that the app store is not just a hypothetical monopolist, but an actual monopolist, as those terms are used for market definition. The fact that it could, in the hypothetical, raise price substantially, shows that it can impose a SSNIP and that the provision of payment solutions to the targeted group is a price discrimination market.

255. Having discussed the pertinent principles, I now turn to defining the relevant market for analyzing Apple's payment processing restrictions.

2. Relevant Product Market Analysis

256. The App Store has imposed its IAP requirement on a targeted group: developers of iOS apps that sell digital content to customers within the app. Those apps have to use IAP, and therefore Apple's payment solution, rather than their own. They also must pay a commission of 30% on most transactions, with an average commission across all transactions of 27.7%.

257. The App Store can enforce this requirement by blocking these particular apps from the App Store if they do not use IAP. Apple has done that to Fortnite and at least 2,000 other app submissions. And the record evidence shows that, for example, in 2011, Apple forced developers that were using other solutions to execute transactions within the app to begin using IAP for subscriptions instead of their self-supplied solutions.

258. As in the hypothetical, therefore, to determine the market boundaries, the analysis begins by asking whether the App Store, as a hypothetical monopolist, could profitably increase the price targeted developers pay for payment solutions by a SSNIP over a competitive level. If it could not, then the analysis should consider expanding the market to other channels of app distribution.

259. While we do not have clear evidence of the rates paid by app developers for payment solutions back in the 2009-2011 timeframe, based on the list fees for leading payment processors today, I have calculated that the average fee for transactions is 5.9% on a $10 U.S. transaction because many competitive payment processors charge 2.9% + $0.30 per transaction for their services. The average list price would be lower for larger transactions, and larger developers would likely pay less than list. Payment processing fees are higher in lesser developed countries than in the U.S. The average fee for transactions for Epic, which is a large developer with transactions in many countries, was 4.3% in 2019. I assume that the average transaction fee for a developer's own payment solution is 5%.

260. In a competitive market in which developers had the choice of using IAP (along with its higher commission) or their own payment solution, it is possible that some developers would choose to use IAP because of its convenience or because their customers would prefer to use it. Therefore, it is possible that the average transaction fee in a competitive market would be higher than 5%.

261. To take an extreme upper bound, I assume that apps accounting for 80% of transaction volume would use IAP and pay the average App Store commission of 27.7%, and that the remaining 20% would pay the average competitive price of payment solutions of 5%. In this highly conservative case, the average commission rate for IAP transactions would be 23.2%, based on a weighted average of the 5% and 27.7% transaction fees. To be clear, I am therefore assuming, conservatively, that the competitive rate for iOS in-app purchases is 23.2%, and not 5%.

262. Based on this upper bound, I calculate that the App Store was able to raise the average commission from the competitive level by at least 4.5 percentage points, from 23.2% to 27.7%, by requiring the targeted app developers to use IAP. That implies a 19.4% increase in the competitive level (27.7/23.2 - 1). That increase is much higher than the upper bound of a standard SSNIP, which is 10%.

263. The App Store, as the hypothetical monopolist, can therefore raise the price of payment solutions to the targeted group of developers by a substantial amount. It is not constrained by developers switching to another iOS app distribution channel because Apple allows no others. Developers also cannot substitute distribution through an Android app distribution channel because iOS app users cannot use Android apps. This finding is consistent with my earlier finding that the App Store has monopoly power in iOS app distribution.

264. I conclude, based on my economic analysis, that the relevant market for evaluating Apple's IAP requirement is the market for payment solutions for accepting and processing payments for purchases of digital content made within an iOS app. This relevant market is single-sided because developers are providing payment solutions for their own customers, and most of the payment processors are not in the business of connecting consumers and merchants but rather of providing merchants with a service.[114]

265. The relevant market could be considered an aftermarket for smartphone OSs, or iOS app distribution, only insofar as Apple's IAP requirement forces developers to use Apple's payment solution. Without that requirement, the targeted app developers would have payment solutions available to them that do not directly involve smartphone OSs or app distribution at all.

3. Relevant Geographic Market

266. The relevant geographic market is global, excluding China. To serve customers around the world, developers require payment solutions to work in many countries. The payment processors they hire to help them do that often provide services in many different countries, and country coverage is one of the dimensions on which payment processors compete. However, Chinese government restrictions have created an insular market that makes it more difficult to operate in China, either as a payment processor or as a global developer.

[114] Developers sometimes use digital wallets, such as PayPal, which are two-sided payment platforms for consumers and merchants, in addition to payment processors that sell payment processing services directly to merchants.

Developers that are mainly seeking customers outside of China typically do not use Chinese payment processors, and Chinese payment processors are generally not considered for providing payment processing services to these developers.

D. Apple's Monopoly Power in the iOS In-App Payment Solution Market

267. In this section, I consider whether Apple has market power in the iOS in-app payment solution market defined above and I conclude, based on my economic analysis, that Apple has monopoly power in this relevant market for the following reasons, documented above:

i. Apple, like the hypothetical monopolist in the scenario described above, is an actual monopolist because the targeted developers have no other payment solution option and no other app distribution option.

ii. Apple has raised transaction fees paid by developers for payment solutions substantially above the competitive level, as shown above.

iii. Apple has been able to raise transaction fees because it can block developers from iOS app distribution, and therefore from accessing iPhone users, if they do not comply with its IAP requirements.

iv. Apple has been able to impose terms and conditions that prevent apps subject to the IAP requirement from accessing customized and innovative payment solutions provided by third-party payment processors, such as tools that help improve authorization rates on payments; tools that allow developers to customize risk management and fraud protection; internal data and analytics functions (*e.g.*, tag metadata to transaction records for analysis throughout the transaction lifecycle); and value-added services based on visibility into the developer's payments stream (*e.g.*, business financing).

268. Apple's monopoly power in the market for accepting and processing payments for digital content purchased within an iOS app is protected by barriers to entry into smartphone operating systems (pages 23-23) and the barriers to entry into iOS app distribution (page 39). Apple's monopoly power in this market is durable, as reflected by the fact that it has imposed the IAP requirement for more than a decade. Its commission rate for in-app purchases has remained constant at 30% for most apps; the overall commission rate has declined to an average of 27.7% largely as a result of charging a 15% commission for renewals of subscription apps after the first year (pages 38-39).

E. Apple's IAP Requirement Causes Anticompetitive Effects

269. Apple could have offered to supply developers with its IAP payment solution without forcing them to use it. If it had, IAP would have competed with payment solutions self-supplied by developers and/or supplied by online payment processors that compete for developers' business. Apple's IAP requirement eliminated both elements of competition:

developers cannot compete to supply their own payment solution instead of relying on Apple's, and they cannot benefit from competition for their business among payment processors.

270. Based on the economic analysis described herein, I have found that by suppressing this competition, Apple, in the relevant market for targeted developers:

i. foreclosed competition for payment solutions for thousands of developers for more than [redacted] in transaction revenue in 2019 alone;

ii. substantially raised the price of online payment processing services;

iii. reduced the quantity of in-app transactions and thereby the quantity of payment processing services;

iv. reduced the quality of payment solutions developers could have developed with help from online payment processors; and

v. reduced innovation in payment methods that developers could have achieved working with online payment processors.

1. Market Foreclosure

271. Using data provided by Apple in discovery, I have estimated the scope of the App Store's requirement that targeted developers use IAP, and therefore Apple's payment solution, for transactions between those developers and their customers within their apps. The results are summarized in Table 8 and show that non-Apple payment solutions are foreclosed from a significant number of apps and amount of revenue each year.

Table 8: [redacted][115]

Year	Number of Apps	Developer Revenue ($ billion)	Estimated Purchase Volume ($ billion)
[redacted]			

2. Price and Output

272. Given the widespread interest among large developers in using their own payment solutions, it is likely that more than 20% of the volume of in-app transactions, which I used as a conservative estimate above, would move to competitive payment solutions in the absence of Apple's IAP requirement. I have calculated the competitive price that would have prevailed in the relevant market under alternative assumptions concerning the percent of iOS transaction volume for which developers would use non-Apple payment solutions. The competitive price is based on a weighted average of the estimated 5% transaction fee that developers would pay for transactions using a non-Apple payment solution and the average 27.7% that developers would pay using the IAP payment solution in 2019.

273. I then calculated the percent difference between the actual rate that Apple charged targeted developers in 2019 and the estimated rate in a competitive market in which these targeted developers had the choice of using non-Apple payment solutions. The resulting figure provides an estimate of the percent increase in the competitive price that Apple's IAP requirement caused under alternative estimates of the non-Apple share of transaction volume. Table 9 reports that the estimated percent increase over the competitive price for non-Apple shares ranges from 20% to 70%. It also reports the number of apps accounting for the largest in-app transaction volumes that would have to use a non-Apple payment solution instead of IAP to account for that share of non-Apple payment solution volume.

[115] PX1047 (summarizing DX5408; PX2306).

Table 9: Implied Average Price Increase Caused by Apple's IAP Requirement for Online In-App Transactions at Alternative Diversion Rates[116]

Diversion from IAP (i.e. % of In-App Purchase Volume Choosing a Non-Apple Payment Solution)	Number of the Largest Revenue-Generating Apps Required for This Amount of Diversion	Average Competitive Fee for Payment Solutions for iOS Digital Content Apps	Actual Transaction Fee Charged by Apple for the IAP Payment Solution	Implied Average Price Increase Caused by Apple's IAP Restriction
[1]	[2]	[3] = ([1] x 5%) + ((100% - [1]) x [4])	[4]	[5] = ([4] - [3]) / [3]
20%	22	23.2%	27.7%	19.4%
30%	51	20.9%	27.7%	32.5%
40%	107	18.6%	27.7%	48.9%
50%	204	16.4%	27.7%	68.9%
60%	388	14.1%	27.7%	96.5%
70%	766	11.8%	27.7%	134.7%

274. The figures reported in Table 9 are indicative of the extent to which Apple's IAP requirement raised prices in the relevant market for accepting and processing payments for purchases of digital content within an iOS app. The figures based on higher shares of use of non-Apple payment solutions are more consistent with the empirical evidence reported above (pages 63-64) concerning developer demand for payment solutions. They are not intended to be firm predictions of the competitive price because they do not account for Apple's response to competition; rather, they illustrate the likely effect of Apple's conduct on price in the relevant market. Apple would likely reduce its commission rate for IAP if it had to compete on the merits, or improve the value it provides, and in doing so increase the share of transaction volume captured by its payment solution.

275. Besides raising prices, Apple's IAP requirement reduced the volume of in-app transactions for the targeted developers in the relevant market to the extent they pass some of their costs to their app users. Economic theory and empirical work show that businesses usually pass on some portion of cost increases or decreases to customers. I have found that the median pass-through rate for businesses is 50% based on my prior research. Higher commissions on in-app purchases therefore likely lead to higher consumer prices, and Dr. Rossi's survey showed that iOS app users purchase less at higher prices (though not sufficiently less to deter Apple from raising prices).

3. Quality

276. Payment solutions are differentiated products. They vary based on how developers want to customize their solutions given their business needs and the specialized features and services they use from third-party payment processors. Developers lose the value

[116] PX1056 (summarizing DX5408; PX2306).

that would be available from these differentiated and customized solutions as a result of being coerced to use Apple's one-size-fits-all payment solution. The following identifies specific degradations in quality that result from targeted developers having to use Apple's payment solution rather than one provided in a competitive market.

a. Uber Issues with IAP

277. Apple's effort to make Uber use IAP illustrates the impact on large developers that have their own cross-platform payment solutions of having to use IAP. An Apple executive dealing with Uber sent Uber's concerns in an email:

> "Multi-platform app: Uber's business exists across iOS and Android, and therefore any changes that are unique to iOS create additional burden on our end to build and maintain separate systems. To take advantage of the alleged benefits of IAP, we would need to take on non-trivial work, which we are not staffed to support.
>
> Apple Customer Service: Customer service support was flagged as a key benefit that justifies the IAP fee. That said, Uber has a global in-house customer support network to address our support needs. This system has been customized over time for Ride Pass, and will need to exist for Android users, even if Apple users were re-routed. Furthermore, informing riders of unique customer support policy for iOS users on this business line vs. all others creates a poor user experience. Lastly, given the sensitive nature of our data, sharing it with a 3rd party in this way could create security risks.
>
> Segmented pricing: One recommendation was that we can consider passing the 30% fee to iOS users since they are "price inelastic". We have no evidence that supports that claim and in fact have seen the opposite. Furthermore creating this disparity is a very poor user experience, which we are not interested in supporting.
>
> StoreKit: To enable the suite of benefits that come with IAP, our team would need to set up StoreKit to support our payments. As flagged by the Apple team, this is a non-trivial amount of work. Per the reasons above, there is no clear benefit to us in setting this up."[117]

278. Apple fully recognizes that IAP is not a value proposition. When Apple chose to make IAP optional for the Uber and Lyft ride subscriptions, an Apple executive wrote in an internal email: "[u]nfortunately, IAP being 'optional' means that no one will ever use it."[118]

[117] PX2235.

[118] PX202.

b. Customer Support

279. Forcing targeted developers to use IAP degrades the quality of the support they can offer their customers. With IAP, the developer's customer pays Apple, rather than the developer, even though the transaction is between the developer and its customer. Most consumers are not aware of this, so when they have a payments issue involving in-app purchases, they are likely to contact the developer, because that is who sold them the product or service. But because the developer was not involved in the payment, and because Apple does not share payment details with developers, the developer does not have the transaction details or the ability to work with the payment processors or funders of the card to rectify payments disputes or even issue a refund.

280. Documents produced in discovery illustrate this problem:

i. According to an Apple document concerning an app user complaint in March 2015, "While we accept responsibility for refunding customers, we have almost no insight into the complex IAP issues that customers present to us. As a result, AppleCare is forced to employ blanket rules for refunds. In this case, the customer was appropriately granted 30 days worth of refunds—not his request of every purchase made in the game… I believe that we need to create a centralized system where developers are allowed to better service their customer support issues and grant refunds (cash or in-app)."[119]

ii. A developer emailed Mr. Cook in June 2020 because "one of [his] customers lost a lot of money when their son with special needs spent uncontrollably in our game on the App Store. I am the developer of the app and for more than 3 weeks now both the customer and myself have been trying to have those purchases refunded with no result. Both Apple customer support and developer support have shown a **shocking** lack of empathy for this clear cut case and so far refusing the refund, causing significant financial stress to the customer."[120] (emphasis in original)

iii. In 2016, Apple received complaints from game developers that some players were significantly abusing Apple's refund policy on apps. According to a public source: "Apple holds full control in paying refunds on paid for mobile content such as games. It determines whether to give refunds to consumers. But the content developer cannot take part in the process under Apple's refund policy. Apple does not even provide information about the users who have requested and received the refund, claiming it is to protect consumer rights. For this reason, the developers have no other choice but to manually track down the users and check if they continue to use the charged content they have already

[119] PX2189.

[120] PX2365.

> received refunds for."[121] One reason that players were able to abuse Apple's refund system is that Apple did not notify the developer when a refund was issued. Therefore, the developer had no way of knowing when they should claw back the in-game content from the player.

281. The Mac App Store also uses IAP and Apple's payment solution. Apple's survey of why developers were not using the store more frequently identified serious issues concerning the ability of developers to offer customer support when they do not handle customer transactions.

i. Adobe complained that "We get little to no analytics on who our customers are, even abstracted, unless they opt-in… Our positioning is based on customer reviews, but we have no mechanisms to respond to bad reviews or customer complaints. (Poor feedback channels) …No control over refunds or remediation if there is a problem."[122]

ii. Bare Bones Software complained about "Destruction of the customer relationship, caused by separation of the customer from the developer (we don't know who our customers are). …Limitations on product scope, functionality, and documentation, created by submission guidelines and sandboxing restrictions."[123]

iii. Bohemian Coding complained that "It is frustrating that we can't reply to 1-star reviews, can't process refunds and don't get users's [sic] contact details."[124]

c. IAP Product and Pricing Requirements

282. Developers can choose their own product features and prices when they use their own payment solutions but not if they must use IAP, which requires developers to adhere to rigid price and product templates. This product limitation is so significant that Apple had to remedy it for the developers that are in Apple's Video Partner Program, which could not manage their package offerings using iTunes Connect (now App Store Connect). According to one Apple document:

> Apple does not support complex bundling and tiering of subscriptions and subscription add-ons. Because of these limitations, partners offering subscription video on demand (SVOD) and multichannel video programming

[121] APL-APPSTORE_09799559.

[122] DX4024 at '714; PX133.

[123] DX4024 at '721.

[124] DX4024 at '726.

distribution (MVPD) services on other platforms cannot offer the same services on the App Store.[125]

283. Apple requires that developers that use IAP for their in-app purchases choose from among Apple's pre-defined "price tiers." They therefore do not have complete flexibility to set their own prices. Each tier includes a fixed price for every international currency supported by Apple. For example, Tier 1 is a price of $0.99 in U.S. dollars, 0.79 in Euros, 0.59 in British Pounds, and so on. A developer choosing to price their product or service at Apple's Tier 1 price must simultaneously accept the prices set by Apple in all of the available currencies (and thus is forced to use the implied exchange rates between currencies set by Apple). Apple can and does change the foreign currency prices in each price tier from time to time at its own discretion and without input from developers.

4. Innovation

284. Distributed innovation arises when new ideas are introduced as a result of the interaction between several participants in the economy. Businesses have particular problems they need to solve. They hire other businesses to help them out. Innovations come through this iteration. And those innovations get diffused: a business seller may find that many of its customers have a common problem and come up with a solution that serves them, and if successful, the seller can then market the solution more broadly.

285. Apple's IAP requirement blocks this distributed innovation for targeted apps. Developers subject to the IAP requirement cannot work directly with payment processors to come up with solutions for particular ecommerce and payment processing issues they face for iOS apps. The fact that some online payment processors work directly with Apple does not replace this lost innovation. Those online payment processors work with a single customer, Apple, that cannot know the unique issues that the thousands of digital content apps that must use IAP face, and are therefore driven to develop a single templated solution.

F. Summary of Findings on Economic Issues Related to Tying

286. Apple has tied together the sale of two distinct products or services. There is separate demand for iOS app distribution services and for payment solutions for transactions between iOS app developers and app users (pages 61-65).

287. Apple possesses enough economic power in the tying product market, the iOS app distribution market, to coerce its customers into purchasing the tied product. The App Store has a monopoly in app distribution protected by substantial barriers to entry (pages 35-39). Apple can therefore force iOS app developers to use IAP, and thereby process transactions using Apple's payment processing method, because those developers do not have any way other than the App Store to distribute their apps to iPhone users. Choosing not to comply with the IAP requirement and distribute through the App Store, and thus exiting iOS entirely, would

[125] PX2142.

be unprofitable for most developers because they would be cut off from the large installed base of iOS users who cannot be reached through other distribution channels.

288. The tying arrangement affects a not insubstantial volume of commerce in the tied product market, the iOS in-app payment solutions market. The relevant antitrust market for assessing Apple's IAP requirement comprises solutions for accepting and processing payments for digital content purchased within an iOS app (pages 65-69). Developers accounting for more than [redacted] in 2019 transactions were subject to Apple's payment processing restrictions (pages 70-71).

289. Absent these restrictions, many of these developers would have chosen not to use Apple's payment solution (pages 71-72). Those developers, likely accounting for the preponderance of all developers and transactions subject to Apple's requirement, were foreclosed from providing their own customized payment solution and making use of specialized features available from a wide array of online payment processors (pages 72-76). At the same time, online payment processors were foreclosed from competing for those developers' business and from working with them to develop customized solutions (page 76).

G. IAP as a Metering Device

290. Some firms tie products together for the purpose of metering sales. That enables the firm to extract more money from customers. A classic case, from the early history of computing, involved using punched cards to measure the consumption of computing services. In theory, price discrimination does not necessarily reduce consumer surplus, so the use of these metering devices to engage in this practice is not necessarily bad. And, in theory, the profits from price discrimination may provide a reward to a firm to make investments, including in innovation.

291. An important assumption underlying these theories is that the metering device does not impose any other distortions that could reduce consumer surplus. A requirement that consumers use a simple, undifferentiated commodity product, such as a punch card, does not likely cause distortions. The consumer could not obtain a higher quality product in the absence of the tie. The metering device therefore is really nothing more than that—it is just a counting method that helps the firm engage in price discrimination.

292. Apple's IAP payment solution, however, is far from an innocuous metering device. Developers lose value by having to use Apple's one-size-fits-all payment solution rather than solutions that are differentiated and customized to their needs. Developers lose value from being: unable to provide customer support for their own customers; unable to offer differentiated products and services in their apps because they have to use IAP's product and pricing templates; and prevented from developing or enjoying innovative payment solutions for iOS apps in concert with payment processors.

293. There is no economic basis for allowing a firm with a monopoly in one product to force its customers to use another product as a metering device so it can make more profits when doing so causes substantial harm to competition and consumers.

VIII. CONCLUDING REMARKS

294. Apple, via the App Store, is a gatekeeper for a substantial part of the digital economy during a time when the digital economy itself is becoming a much larger part of the overall economy. The App Store is not just a typical platform, like Nintendo, operating as a walled garden. It is one of two entities that controls almost all mobile app distribution for the digital economy in the United States and the rest of the world, apart from China.

295. Millions of apps, including many economically significant businesses, as well as aspiring firms, must use the App Store to gain access to 1 billion iPhone users globally.[126] They have no other channel to reach these users if Apple says no. Even the largest businesses, such as Facebook and Microsoft, have had little luck in negotiating with Apple when it comes to app distribution through the App Store.

296. Thousands of iOS app developers are required to use IAP and Apple's payment solution for digital goods and services that they sell to customers who use their apps on iPhones. Apple generally charges developers 30% of the value of the purchase, aside from some exceptions that lower the average rate to about 27.7%. Apple could extend IAP, or something similar, outside of digital goods and services, and has already made forays into apps that provide physical services. There are no limiting principles to Apple imposing a tollbooth between iOS app developers and their customers.

297. When Apple launched the App Store, it said its fees would cover its costs and that it would roughly break even. That made business sense because, by making it easy for developers to distribute apps, and iPhone users to get them, Apple made the iPhone more attractive, and the App Store could drive Apple's hardware sales. Instead, operating as a monopoly distributor of iOS apps, the App Store has earned extraordinary profits, with around 80% earned from commissions going to Apple's bottom line.

298. Based on the economic research and analysis reported above, I have found that, by creating an artificial monopoly in iOS app distribution, and by tying its payment solution to app distribution, Apple harmed competition, raised prices, reduced quality and output, and slowed innovation—as compared to the but-for world without Apple's restrictions. Apple's conduct also caused injury to iOS app developers and users.

299. Apple did not have to block all channels of distribution, other than its own, to create value for iPhone users and app developers. The Windows and macOS operating systems for personal computers became enormously successful without doing so. In China, most consumers have Android smartphones, developers have faced no material constraints on distributing apps to them, and a vibrant app ecosystem has emerged.

300. Any claim of lost efficiencies from ending the conduct at issue must be based on comparing the but-for world, where Apple continues to operate the App Store and IAP, and the

[126] Based on a document that I understand was produced on February 15, 2021, there are [redacted] iPhone users globally, excluding China. APL-EG_07489464.

actual world with its anticompetitive conduct. It must also account for policies that Apple could adopt to mitigate lost efficiencies, if there are any, so long as those policies are not themselves anticompetitive. Apple could create value for iOS app users and developers by competing on the merits without its restrictions. It could have the App Store, bundle it with the iPhone, and operate it as it does now if that makes business sense when competition exists, so long as distribution through the App Store is optional, thereby opening the iOS app distribution market to competition. Apple could also continue to offer IAP, and the Apple payment solution, so long as it does not mandate its use but instead competes with other payment solutions.

* * *

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct and that I executed this written direct testimony on April 20, 2021, in Marblehead, Massachusetts.

WORD COUNT: 30,200

David S. Evans